# **USAAVLABS TECHNICAL REPORT 66-6**

# ENGINEERING LABORATORY REPORT OV-1A MOHAWK FLIGHT LOADS INVESTIGATION PROGRAM

By

**David Chestnutt** 

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### ENGINEERING LABORATORY REPORT

Project 1P125901A14229, House Task 65-15 USAAVLABS Technical Report 66-6 January 1966

OV-1A MOHAWK FLIGHT LOADS INVESTIGATION PROGRAM

Ву

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### **SUMMARY**

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A primary objective of this effort was to provide operational data for establishing future short takeoff and landing (STOL) aircraft design criteria. To accomplish this end, two OV-1A aircraft were selected that were participating in air-assault maneuvers. Approximately 200 hours of flight data were recorded within approximately 10 weeks. The parameters recorded were: airspeed, altitude, outside air temperature, and acceleration at the aircraft center of gravity. In addition, supplementary data were collected on the type of mission and gross weight of the aircraft. These data are presented as several frequency-of-occurrence forms, exceedance curves, and gust spectra.

#### **FOREWORD**

This program was sponsored by the Aeromechanics Division and was performed by the Engineering Laboratories Division of the United States Army Aviation Materiel Laboratories (USAAVLABS), Fort Eustis, Virginia. A contractor, Technology, Inc., provided assistance in data collection and reduction. Acknowledgment is given to Mr. Joseph Braun, Mr. C. G. Peckham, Mr. J. F. Nash, Mr. W. E. Morrin, and Mr. David Etter of Technology, Inc., for their contributions to this report and to Dr. R. G. Loewy, who served as consultant for the program. A special acknowledgment is extended to Mr. Larry E. Clay of Technology, Inc., for his help in writing the Results portion of this report.

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#### INTRODUCTION

A 203.9-hour statistical sample was collected on two operational aircraft of the 1st Cavalry Division, Airmobile (formerly 11th Air Assault Division). The data were recorded primarily in the maneuver area around Lugoff, South Carolina, from 9 September until mid-November 1964. The data recorded consisted of four parameters: airspeed, altitude, outside air temperature, and acceleration at approximately the aircraft center of gravity. In addition, supplementary data consisting of barometric pressure, ambient temperature, and gross weights of the aircraft before and after the flight were collected for each flight. The types of missions flown were as follows:

Mission I: Tactical training, assault force mobility, combat support mobility, aerial command post, reconnaissance - general, screening/surveillance, air escort, combat service support, and test flights.

Mission II: Fundamental training, radio relay, messenger, photo, and administrative.

The data were presented in several frequency-of-occurrence forms:

- 1. Diagram and tabulation of maneuver load factors versus equivalent airspeed, average time per flight, and so forth.
- 2. Histograms showing the percentages of flight time spent in selected ranges of the recorded parameters.
- 3. Exceedance curves showing the number of hours required to reach or exceed both maneuver and gust normal load factors.

In addition, for each incremental gust-induced acceleration above 5 feet per second, a gust velocity was derived; from these results, a gust spectrum was plotted and a tabulation was made of altitude versus derived gust velocity.

### **OBJECTIVES**

The primary objectives of this program were:

1. To provide operational data for establishing future STOL aircraft design criteria.

- 2. To accumulate a minimum statistical sample of 200 flight hours of valid OV-1A operational data.
- 3. To present this information in a form for use by aircraft designers depicting U. S. Army field usage.
- 4. To perform limited preliminary analysis on these results.

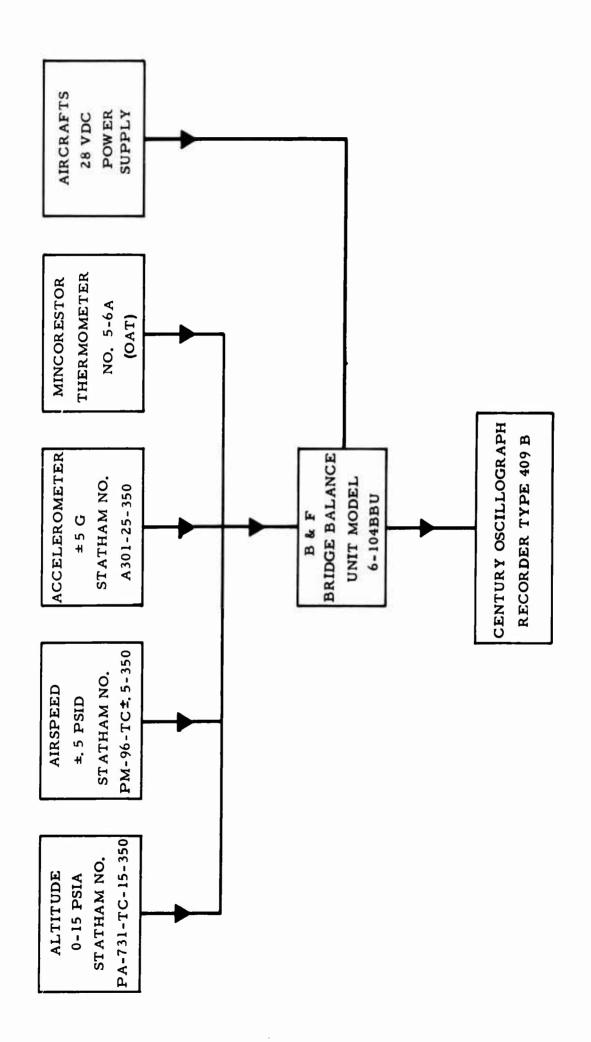
#### **METHOD**

Two OV-1A aircraft were selected to obtain a minimum statistical sample of 200 flight hours of operational data. The aircraft were property of the 226th Aerial Surveillance and Escort Battalion of the 1st Cavalry Division, Airmobile. The maneuvers conducted from September until mid-November 1964 were of particular interest in that combat was simulated using the most advanced operational air-assault tactics. The two aircraft monitored during this maneuver were armed and flown on missions of low-level troop fire support and helicopter escort in addition to more routine missions.

Figure 1 is a schematic showing the instruments used to record continuously the parameters of altitude, airspeed, outside air temperature, and acceleration at the aircraft center of gravity. Calibrations were performed on all transducers as follows:

- 1. A "turnover" of ± lg was performed on the accelerometers in the field.
- 2. The altitude and airspeed transducers were connected to the aircraft Pitot-static system, and the entire system was recalibrated with a pressure standard in the field.
- 3. The temperature gauge was calibrated with a standard mercury-in-glass thermometer after installation.

Reference channels recorded along with the operational data included two mechanical reference traces timing marks at 1 pulse per second and a voltage monitor trace. The bridge balance unit was used for balancing each circuit prior to each flight and for inserting a fixed calibration signal on each analog channel per record. The chart speed was approximately 4 inches per minute, which allowed recording of up to 7-1/2 hours of flight time per 150-foot roll of oscillographic paper. The recording system was wired to start when the engine ignition switch was turned on and stop when this switch was turned off.



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Figure 1. Block Diagram of OV-1A Recording System.

When approximately 7 hours of flight time had been recorded, the record was removed, developed in the field, marked, and sent to the data reduction facility at Technology, Inc., Dayton, Ohio.

At Technology, Inc., the data were scanned a second time for validity, and each record was converted to computer cards by using the semi-automatic Benson-Lehner Oscar K data readers. The basic methods of reducing the data involved reproducing the analog traces by reading the records at varying time intervals not exceeding 2 minutes of flight, depending on the activity of the particular trace. In addition, whenever an acceleration reading peaked outside of the  $\pm 0.25g$  threshold, all traces were read at that instant. These tabulations were converted to magnetic tape and combined with a computer program to obtain the print-outs in this report.

The most interesting calculation was that of derived gust velocity ( $U_{
m de}$ ) for each gust-induced acceleration. The equation used was as follows:

$$U_{de} = \frac{1.1850 \text{ W n}_z}{\text{m } \rho_0 \text{ S V}_e \text{ K}_g},$$

where U<sub>de</sub> = derived gust velocity, feet per second

W = gross weight, pounds

m = lift curve slope (per radian) = + 4.86

 $\rho_0$  = sea level density = 0.0323779 slugs per cubic foot

S = wing area = 330 square feet

Ve = equivalent airspeed, knots

K<sub>g</sub> = gust factor, defined as follows:

$$K_g = \frac{0.88 \mu_g}{5.3 + \mu_g}$$

and

$$\mu_{g} = \frac{2W/\rho_{o}}{m \sigma \geq Sg}$$

where

g = dimensional constant = 32.174 feet per second squared

 $\sigma$  = density ratio  $\rho/\rho_0$ 

c = mean aerodynamic chord = 8.15 feet

p = density, slugs per cubic foot

Substitution of the constant values into the equation for Ude yielded

$$U_{de} = (938.35 \sigma + 0.3531W) \frac{\Delta n_z}{V_e}$$

At the conclusion of the 200-hour data collection on the OV-1A, the instrumentation was removed and modified for use on other U. S. Army aircraft.

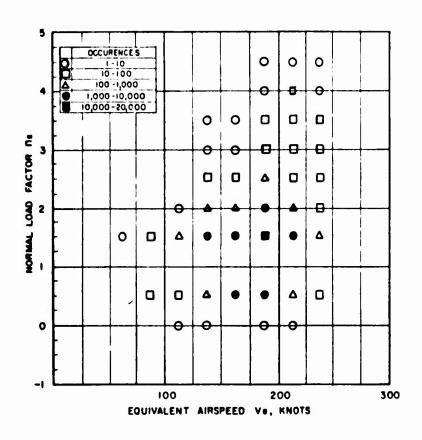
#### RESULTS

Results of this program are shown in Figures 2 through 18 and in the computer print-out tables in the appendix of this report.

In order to compute only gust velocities,  $U_{de}$ , over a 5-foot-per-second threshold, a  $\pm 0.25 \mathrm{g}$  limit was set for reading changes in vertical acceleration. Values of  $U_{de}$  were derived primarily from changes in vertical acceleration. It is possible that not all  $U_{de}$ 's above this threshold were derived, since a combination of high gross weights accompanied by minimum airspeeds and low altitudes could have resulted in small changes in vertical accelerations, in spite of some significant gusts. As a result, the gust spectra presented in this report may be biased for  $U_{de}$  ranges below an estimated 20 feet per second.

Figures 2 through 18 are briefly described in the following:

Figure 2 shows a diagram and a tabulation of n<sub>z</sub> data. The symbols in this figure denote the number of maneuver load factors in combinations of airspeed and load factor ranges. The design limit load factor of 7.33g was not exceeded in the data collected during this program. Mission I flights comprised nearly two-thirds of all flights, and Figure 3 shows that the average time per flight was longer for Mission I than



1.040		Ε	QUIVALEN1	AIRSPE	ED Ve.	KNOTS			
LOAD Factor na	LESS THAN 75	75 To 100	100 To 125	125 To 150	150 To 175	175 To 200	200 To 225	225 AND ABOVE	TOTAL Ne
ABOVE 4.75									
4.25 To 4.75						1	2	ı	4
3.75 To 4.25		-				2	16	3	21
3.25 To 3.75				2	1	22	62	25	112
2.75 To 3.25				1	6	50	37	12	. 106
2.25 To 2.75				23	97	223	83	21	447
1.75 To 2.25			6	161	813	1306	240	19	2545
1.25 To 1.75	'	40	271	1681	9795	12530	1386	86	25798
0.25 To 0.75		18	73	432	2067	2920	273	22	5605
-0.25 To 0.25			1	2		8	2		13
TIME (min)	2.0	61.9	392 7	1252 9	43099	54990	6860	29 6	12234.4

Figure 2. Diagram and Tabulation of Maneuver Load Factors Versus Equivalent Airspeed - Composite for All Missions, OV-1A.

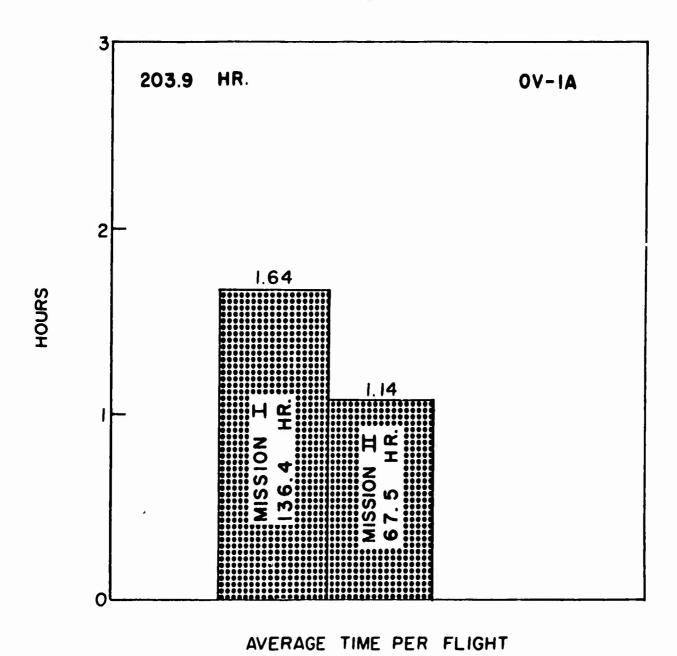


Figure 3. Average Time per Flight by Mission Types.

for Mission II. The percentages of flight time spent at selected airspeeds are presented in Figures 4 and 5.

Mission I flights are, in general, characterized by a faster acceletion to the cruise airspeed and a larger percentage of time at the cruise value than Mission II flights. Over 50 percent of the time of Mission I flights is spent in the 175- to 200-knot airspeed block; nearly 40 percent of the time of Mission II flights is spent in the 150-to 175-knot airspeed block.

The percentages of flight time spent at selected altitudes (Figures 6 and 7) show a very distinct difference between missions. Over 88 percent of the Mission I flights fall in the altitude range of from 0 to

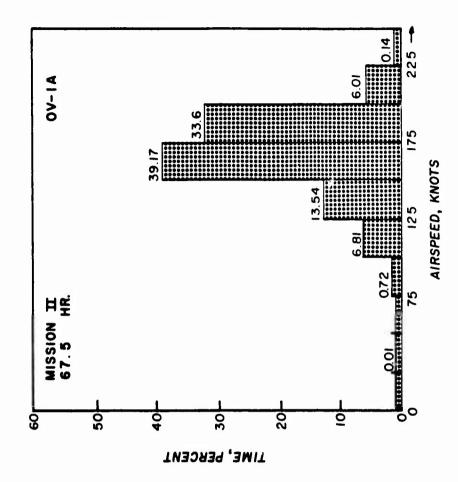


Figure 5. Percentages of Flight Time Spent at Selected Airspeeds Mission II.

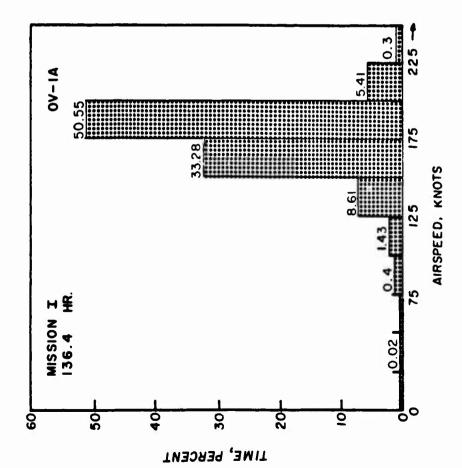


Figure 4. Percentages of Flight Time Spent at Selected Airspeeds Mission I.

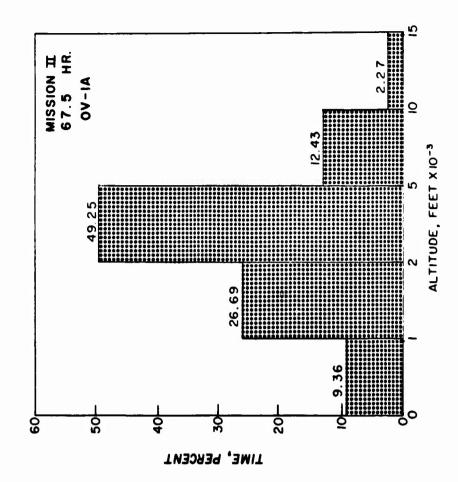


Figure 7. Percentages of Flight Time Spent at Selected Altitudes Mission II.

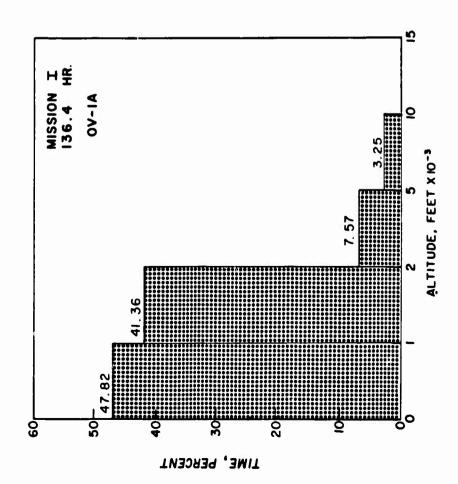


Figure 6. Percentages of Flight Time Spent at Selected Altitudes -Mission I.

2,000 feet, and 50 percent of the Mission II flights fall in the range of from 2,000 to 5,000 feet. This is to be expected, since Mission I flights are mainly of a ground support and surveillance type, whereas Mission II flights contain a large amount of cross-country flying that takes place at generally higher altitudes. A major result of the low-altitude flying of Mission I is that over three times as many gusts were encountered during this mission as during Mission II.

The percentages of flight time spent in selected gross weight ranges shown in Figures 8 and 9 indicate no definite difference between missions. Both missions had a majority of time in the gross weight range of from 13,000 to 14,000 pounds. The largest takeoff gross weight for both missions was 15,269 pounds.

Figure 10 presents the percentages of flight time spent in selected outside air temperature ranges and indicates that the majority of time was spent between the temperatures of 50° and 80° F.

The normal acceleration of the aircraft center of gravity for maneuvers is given as both the normal load factor,  $n_z$ , and the equivalent normal load factor,  $n_z_e$ . The equivalent normal load factor is defined as follows:

$$n_{z_e} = \frac{W_1}{W_d} \cdot n_{z}$$

where

n<sub>z</sub> = normal load factor

W<sub>1</sub> = instantaneous gross weight

 $W_d$  = design gross weight = 11,715 pounds

For both  $n_z$  and  $n_{z_e}$ , the values recorded during Mission I were more severe than those recorded during Mission II. Four  $n_z$  peaks above 4.25g and two  $n_z$  values above 4.75g were recorded. Their corresponding values of airspeed, altitude, and gross weight are listed in Table I.

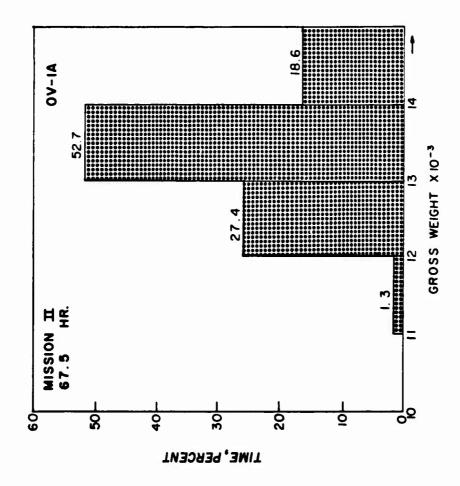


Figure 9. Percentages of Flight Time Spent in Selected Gross Weight Ranges - Mission II.

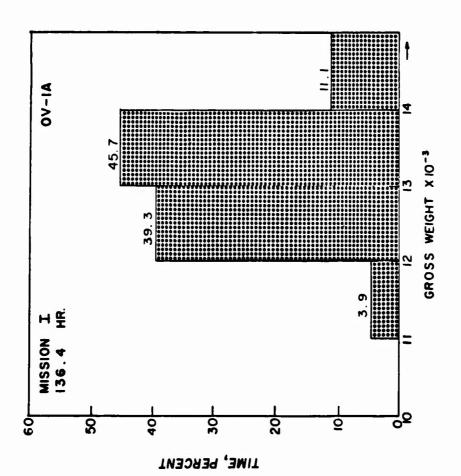


Figure 8. Percentages of Flight Time Spent in Selected Gross Weight Ranges - Mission I.

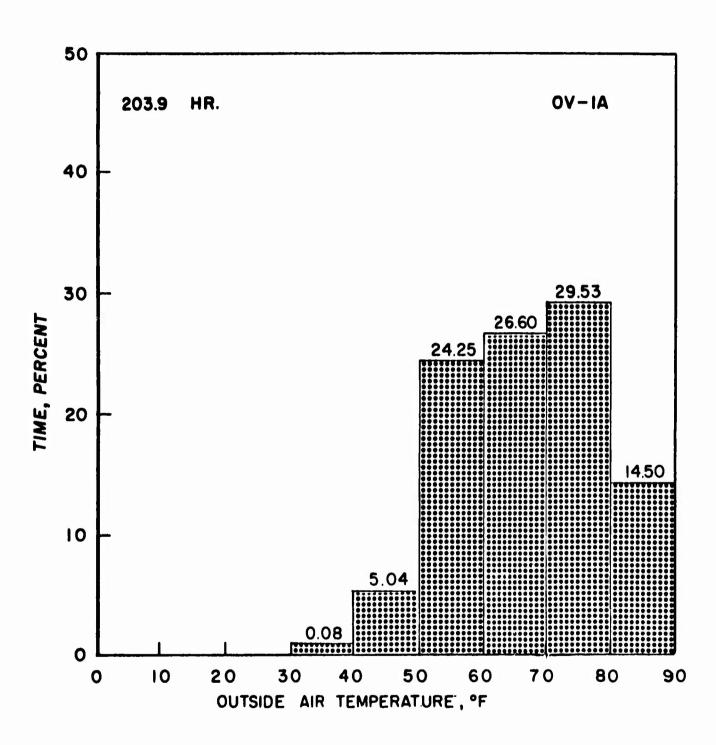


Figure 10. Percentages of Flight Time Spent in Selected Outside Air Temperature Ranges - Composite for All Missions.

TABLE I HIGH VALUES FOR n<sub>z</sub>

nz	n <sub>z</sub> e	Airspeed (Knots)	Altitude (Feet)	Gross Weight (Pounds)
4.18	4.94	211	888	13,841
4.25	4.37	203	1,000	12,082
4.27	4.73	203	927	13,758
4.28	4.51	215	828	12,330
4.34	4.97	226	1,500	13,418
4.34	4.97	226	1,500	13,418

All values were recorded during Mission I. The highest  $n_z$  block reached during Mission II was from 2.25 to 2.75g, which had four points recorded; the highest  $n_z$  block was from 2.75 to 3.25 g, which had one point recorded.

Maneuver load factor exceedance curves indicating the time required to reach or exceed given maneuver load factors are presented in Figures 11 through 13. The exceedance values for Mission I are considerably more severe than those for Mission II. Figures 14 through 16 show the equivalent maneuver load factor exceedance curves and indicate that the exceedance values are more severe for Mission I than for Mission II.

The distances in nautical miles required to reach or exceed given derived gust velocity values for selected altitude ranges are given in Figure 17. Of the 54,255 U<sub>de</sub> occurrences tabulated, 5,815 were within the threshold of -5 to +5 feet per second. The two highest U<sub>de</sub>'s recorded were between 30 and 35 feet per second. The gust spectrum presented in Figure 18 is based on U. S. Air Force data and is used as a standard by the U. S. Air Force.\* It provides a basis of comparison for the OV-1A gust spectrum.

<sup>\*</sup>Erwin Joseph, The Spectrum of Turbulence for Aircraft Fatigue
Analysis, WCLSSC-10 Memorandum, Wright-Patterson Air Force
Base, Ohio, July 1959.

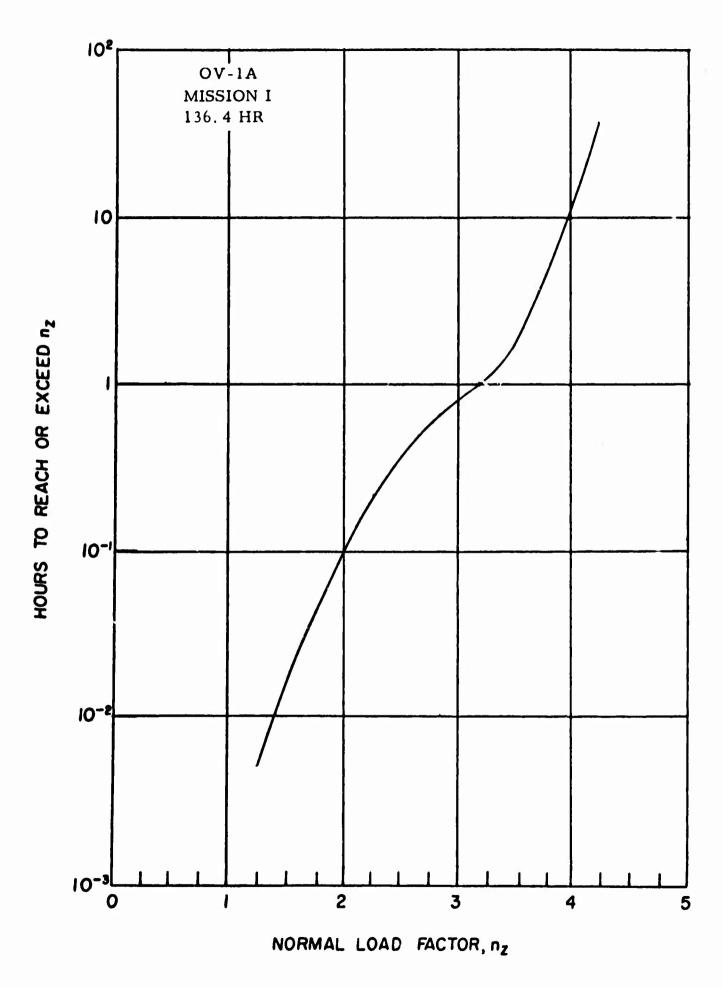


Figure 11. Maneuver Load Factor Exceedance Curve - Mission I.

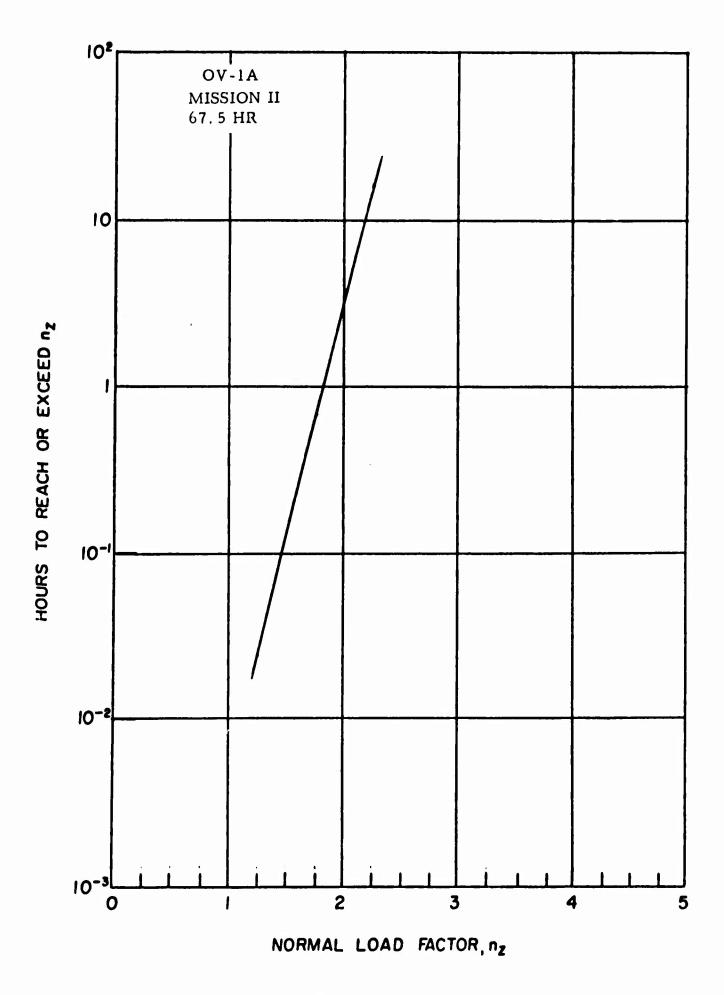


Figure 12. Maneuver Load Factor Exceedance Curve - Mission II.

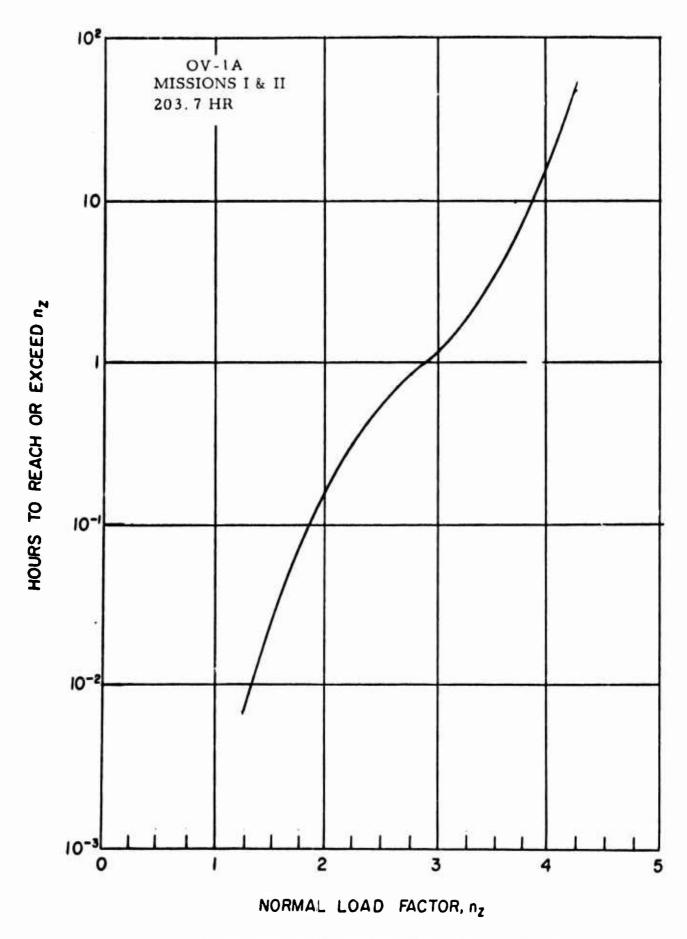


Figure 13. Maneuver Load Factor Exceedance Curve - Composite for All Missions.

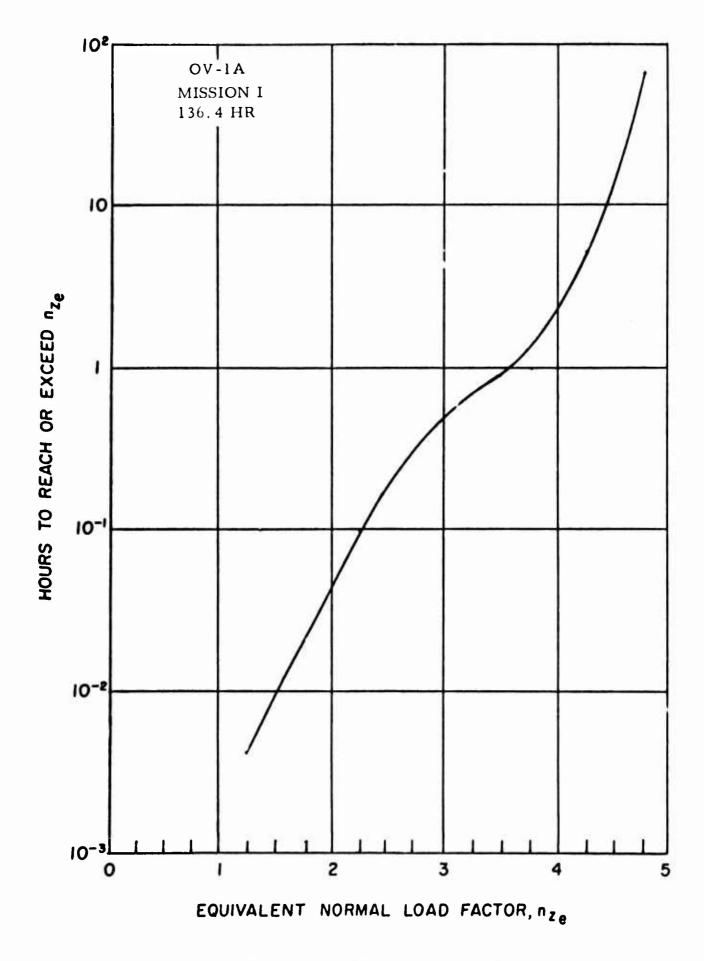


Figure 14. Equivalent Maneuver Load Factor Exceedance Curve - Mission I.

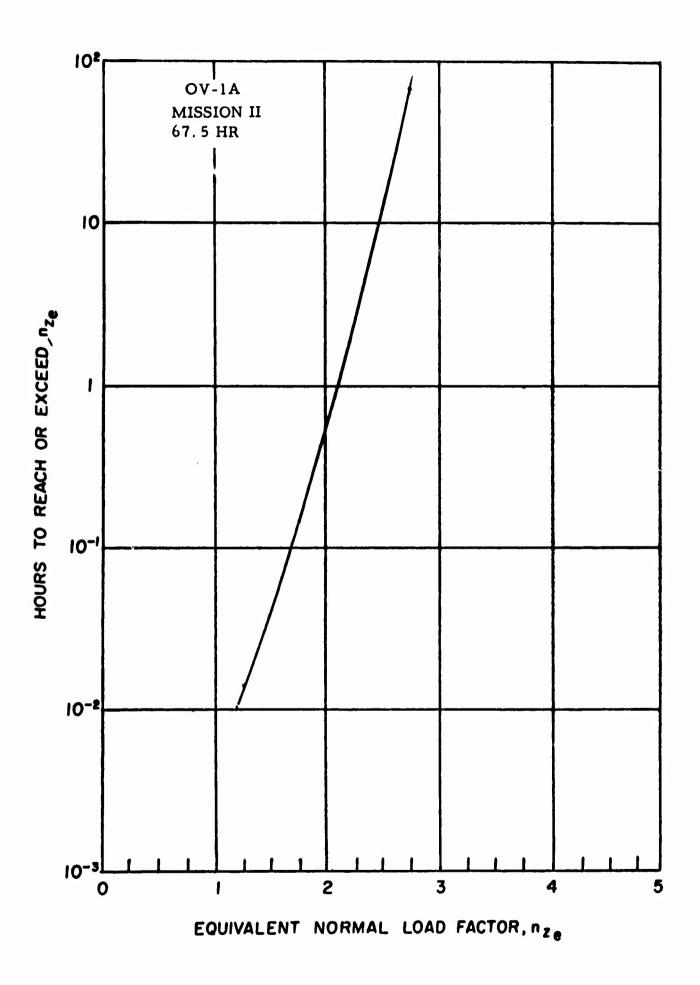


Figure 15. Equivalent Maneuver Load Factor Exceedance Curve - Mission II.

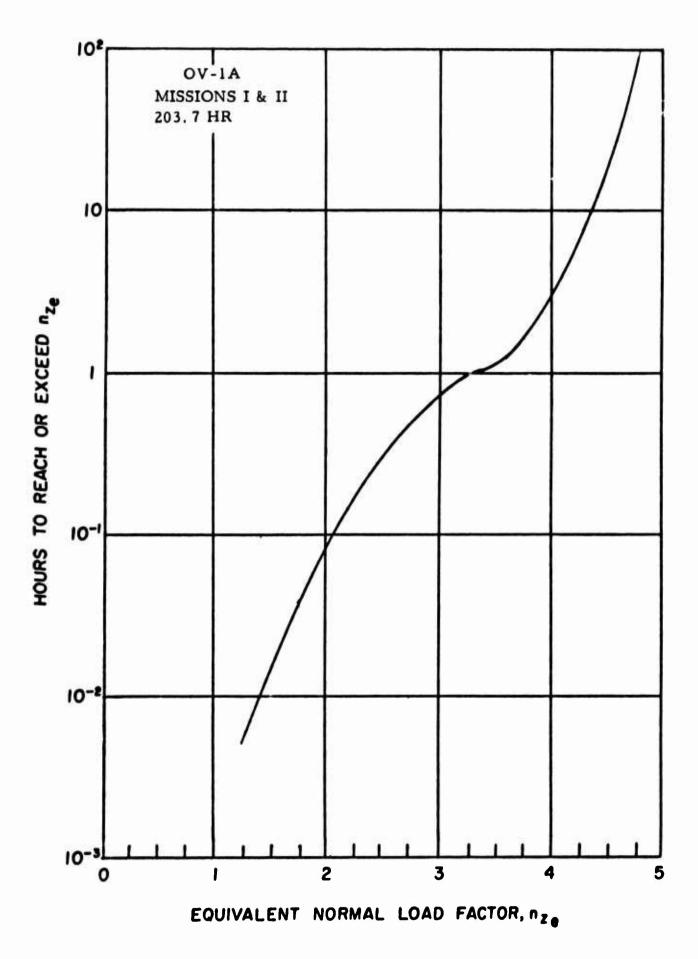


Figure 16. Equivalent Maneuver Load Factor Exceedance Curve - Composite for All Missions.

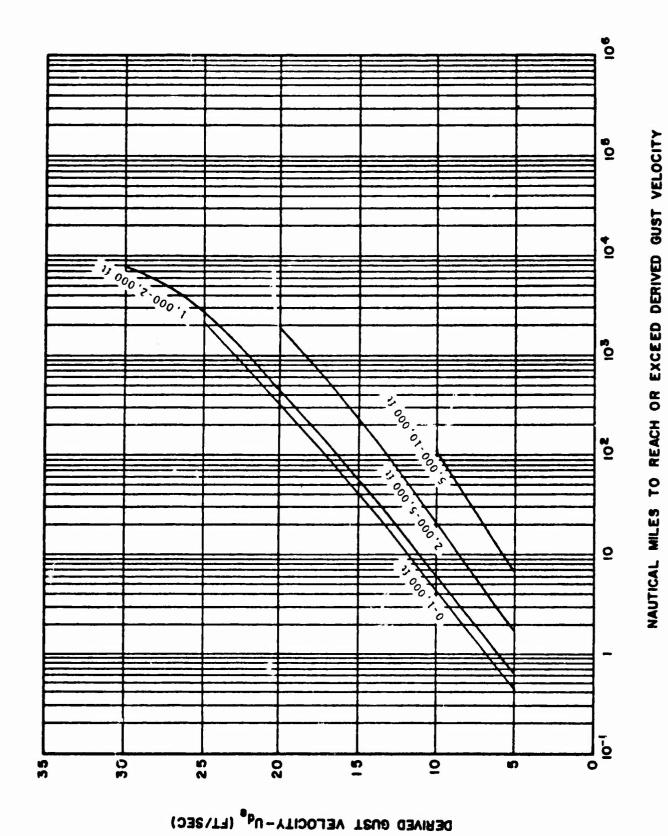


Figure 17. Gust Spectrum Based on Data From OV-1A Aircraft.

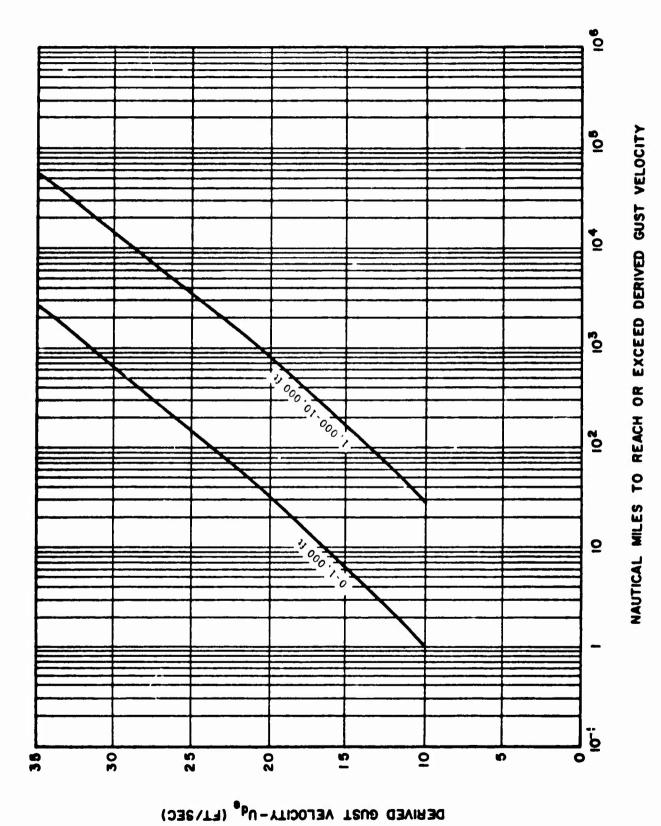


Figure 18. Standard Gust Spectrum.

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### APPENDIX

### FLIGHT DATA PRINT-OUTS

An explanation of Tables II through XVI follows:

- 1. All tables are computer print-outs.
- 2. All times are shown in minutes unless otherwise specified.

  Values of time are rounded off to the nearest one-tenth of a minute.
- 3. Tables having no points or no time are not included.
- 4. The range codes for the various parameters are as follows:

OUTSIDE A	IR TEMPERATURE		AIRSPEED
	(° F)		(Knots)
Code	Range	Code	Range
<u> </u>	<u> </u>	<u>ooue</u>	range
Less	Below 0	Less	Below 75
0	0 to 10	75	75 to 100
10	10 to 20	100	100 to 125
20	20 to 30	125	125 to 150
30	30 to 40	150	150 to 175
40	40 to 50	175	175 to 200
50	50 to 60	200	200 to 225
60	60 to 70	225	Above 225
70	70 to 80		
80	80 to 90		
90	Above 90	ALTIT	UDE
		(Fee	et)
WE	IGHT		
(Po	unds)	Code	Range
Code	Range	Less	Below 1,000
<del>-</del>		1,000	1,000 to 2,000
Less	Below 10,000	2,000	2,000 to 5,000
10,000	10,000 to 11,000	5,000	5,000 to 10,000
11,000	11,000 to 12,000	10,000	10,000 to 15,000
12,000	12,000 to 13,000	15,000	15,000 to 20,000
13,000	13,000 to 14,000	20,000	20,000 to 25,000
14,000	Above 14,000	25,000	Above 25,000

Ude (Feet per Second)

DELTA  $n_z$  ( $n_z$ -1.0), MANEUVER  $n_z$ , AND EQUIVALENT MANEUVER  $n_{z_e}(g)$ 

Code	Range	Code	Range
Less	Below -40	Less	Below -1.25
-40	-40 to -35	-1.25	-1.25 to -0.75
- 35	-35 to -30	-0.75	-0.75 to -0.25
- 30	-30 to -25	-0.25	-0.25 to 0.25
-25	-25 to -20	0.25	0.25 to 0.75
-20	-20 to -15	0.75	0.75 to 1.25
- 15	-15 to -10	1.25	1.25 to 1.75
- 10	-10 to -5	1.75	1.75 to 2.25
<b>-</b> 5	-5 to 0	2.25	2.25 to 2.75
0	0 to 5	2.75	2.75 to 3.25
5	5 to 10	3.25	3.25 to 3.75
10	10 to 15	3.75	3.75 to 4.25
15	15 to 20	4.25	4.25 to 4.75
20	20 to 25	4.75	Above 4.75
25	25 to 30		
30	30 to 35		
35	35 to 40		
40	40 to 45		
45	Above 45		

An explanation of the print-out code shown on the left of the tables follows:

For the letters MMWA, the first M represents the model, the second M represents mission, W represents weight, and A represents altitude.

The first numeral represents the model number. (There was only one model during this data collection, so the model number is always 1.)

The second numeral represents the mission number. (There were two missions during the collection, numbered 1 and 2.)

The letters A through F are the weight codes as follows:

A - below 10,000 pounds

B - 10,000 pounds

C - 11,000 pounds

D - 12,000 pounds

E - 13,000 pounds

F - 14,000 pounds

TABLE II TIME FOR ALTITUDE VERSUS AIRSPEED BY OUTSIDE AIR TEMPERATURE

		Time (Min	utes) for A	Altitude Ve	rsus Velo	city by OA7	Time (Minutes) for Altitude Versus Velocity by OAT 30 Deg. F		
Vel (Kts.)	0	75	100	125	150	175	200	225	Total
7.11. (F.1.) 0 1,000 2,000 5,000	0.1	4.	4.1	2.4	5.5	4.0	0.5		10.4
Total	0.1	4.0	1.4	2.4	5.5	0.4	0.2		10.4
		Time (Min	utes) for A	ltitude Ve	rsus Veloc	Time (Minutes) for Altitude Versus Velocity by OAT 40 Deg. F	40 Deg. F		
Vel (Kts.)	0	75	100	125	150	175	200	225	Total
Ait. (Ft.) 0		4.9	10.7	18.2	24.0	12.9	3.7	0.3	74.7
000		0.5	11.2	60.7	89.3	88.5	16.3	1.2	267.7
2,000		2.5	45.8	73.9	86.5	50.5	1.6	0.5	261.0
5,000 10,000					1.9	10.4	1.8		14.1
Total		7.9	67.7	152.8	201.7	162.3	23.4	1.7	617.5
		Time (Min	utes) for A	Iltitude Ve	rsus Velo	city by OAT	Time (Minutes) for Altitude Versus Velocity by OAT 50 Deg. F		
Vel (Kts.)	0	75	100	125	150	175	200	225	Total
Alt. (Ft.) 0	0.7	7.6	25.6	30.9	217.4	510.1	69.3	5.2	8,998
1,000		1.4	6.06	115.2	394.2	576.2	82.2	5.2	1,265.3
000			62.6	0.06	246.2	203.9	76.3	5.6	684.9
5,000 10,000				42.9	22.2	7.62	1.7		146.5
Total	0.7	9.0	182.4	279.0	880.0	1,369.9	229.5	13.0	2,963.5

Time (Minutes) for Altitude Versus Velocity by OAT 60 Deg. F

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	Total	866.8	1.265.3	684.	146.5		2,963.5		Total		1209.8	983.2	379.3	40.5	3,254.2			Total	1 614 2	1,080 4	731.1	155.0	34.8	3,615.5		Total	518.3	869.2	295. 1	74.1	-	3,254.2
	225	5.2	5.2	5.6		:	13.0		225		3.5		i		6.2			225	3.1	0.7				3.8		225	0.5	0.3	3.9	0.5		6.2
	200	69.3	82.2	76.3	1.7		6.622	r 60 Deg. F	200	;	50.8	24.9	3.1		140.3		'U Deg. F	200	108.8	37.9	58.1	5.4		210.2	80 Deg. F	200	24.2	19.0	29.9	9.7		140.3
	175	510.1	576.2	203.9	79.7	0 076 1	1, 309. 9	ime (Minutes) for Altitude Versus Velocity by OAT 60 Deg.	175		629.0	230.0	275.1		1,625.7	Time (Minutes) for Altitude Versus Velesitus Lu Over 20 P.	city by OA1	175	803.0	540.4	295.7	105.3	3.7	1,748.1	me (Minutes) for Altitude Versus Velocity by OAT 80 Deg.	175	208.4	269.7	70.2	36.1		1,625.7
	150	217.4	394.2	246.2	22.2	0	0.000	ersus Velo	150	,	324 6	301.6	94.2	40.5	1,182.3	Volon	ora A energ	150	562.9	385.4	329.0	39.5	28.9	1,345.4	rsus Veloc	150	227.2	314.7	128.6	17.1		1, 182. 3
	125	30.9	115.2	90.0	42.9	270 0	2.6.2	ltitude V	125	6 67	2.70	80.9	6.9		231.2	fitude V	2000	125	82.8	4.96	47.1	5.1	2.2	233.9	titude Ve	125	33.2	249.7	0.09	9.5		231.2
	100	25.6	6.06	62.6		182.4		utes) for A	100	23.0	26.3	2.0			51.3	utes) for A		100	35.2	17.7	1.2			54.1	ites) for Al	100	17.1	14.9	2.5	1.2		51.3
1	75	7.6	1.4			0.6		Time (Min	75	14.3	2.3				16.6	Time (Min		75	17.8	1.6				19.4	Time (Minu	75	7.7	0.9				16.6
•	0	0.7				0.7			0	9 0	•				9.0			0	9.0					9.0		0						9.0
Valida	Alt. (Ft.)	0 00	2,000	2,000	10,000	Total			Vel (Kts.)	Ail: (Ft.)	1,000	2,000	5,000	10,000	Total			Vel (Kts.) Alt. (Ft.)	0	1,000	2,000	000	200.01	Total		Vel (Kts.)	0	1,000	2,000	5,000	10, 000	Total

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Time

Total	1,614.2 1,080.4 731.1 155.0 34.8	3,615.5	Total	518.3 869.2 295.1	74. 1 16. 6	1,773.3	Total	4, 294. 2 4, 465. 9 2, 613. 4 769. 0 91. 9	12, 234. 4
225	3.1	3.	225	0.5	0.5	5.2 atures	225	12.7 8.1 8.6 0.5	29.9
200	108.8 37.9 58.1 5.4	210.2	200	24.2 19.0 29.9	9.7	82.8 5. All Temperatures	200	257.0 216.9 190.7 21.7	686.3
175	803.0 540.4 295.7 105.3	233.9 1,345.4 1,748.1 Altitude Versus Velocity by OAT	175	208.4 269.7 70.2	36. I 8. 1		175	2, 163.8 1, 966.4 850.4 506.6 11.8	5, 499.0
150	562.9 385.4 329.0 39.2 28.9	1,345.4	150	227.2 314.7 128.6	17. 1	695.0 592.5 Velocity Composite	150	1,458.5 1,508.2 1,091.8 174.6 76.8	4,309.9
125	82.8 96.7 47.1 5.1	233.9	125	33.2 249.7 60.0	9.5	353.5 Versus	125	234.7 598.5 351.9 64.4 3.3	1,252.8
100	35.2 17.7 1.2	4. l for	100	17. 1 14. 9 2. 5	1.2	8.6 35.7 Time (Minutes) for Altitude	100	112.9 161.1 117.4 1.2	392.6
75	17.8	19.4 5. Time (Minutes)	75	7.7		8.6 Minutes) fa	75	52.6 6.7 2.6	61.9
0	9.0	0.6	0			Time (1	0	2.0	2.0
Vel (Kts.)	1,000 2,000 5,000 10,000	Total	Vel (Kts.)	1,000	10,000	Total	Vel (Kts.) Alt. (Ft.)	1,000 2,000 5,000 10,000	Total

TABLE III

TIME (MINUTES) FOR ALTITUDE VERSUS OUTSIDE AIR TEMPERATURE - COMPOSITE	(Deg.) F 30 40 50 60 70 80 Total		10.4 74.7 866.8 1,209.8 1,614.2 518.3 4,294.2	267.7 1,265.3 983.2 1,080.4 869.2 4,465.8	261.0 684.9 641.4 731.1 295.1 2,613.5	14.1 146.5 379.3 155.0 74.1 769.0	40.5 34.8 16.6 91.9	10.4 617.5 2,963.5 3,254.2 3,615.5 1,773.3 12,234.4	
	OAT (Deg.) F	Alt. (Ft.)	0	1,000	2,000	5,000	10,000	Total	

4-1

MMM	110	į		Equivalen	nt Airspe	Equivalent Airspeed - VE (Knots) W - 11,000 lb	nots) W -	11,000 lb			
		(Feet)	Below	75	100	125	150	175	200	225	Total
		0	0.3	8.0	10.1	5.0	14.9	63.1	1.4		102.8
		1,000		1.2	7.9	29.4	64.6	82.0	5.5		190.6
		2,000				2.7	9.3	13.6			25.7
		5,000									
		10,000									
		15,000									
		20,000									
		25,000									
		Total	0.3	9.2	18.0	37.1	88.9	158.7	6.9		319.1
MMM	110	414		Equivalen	t Airspee	Equivalent Airspeed - VE (Knots) W - 12,000 lb	ots) W -	12, 000 lb			
		(Feet)	Below	25	100	125	150	175	200	225	Total
		0	0.5	4.4	21.8	49.9	403.7	767.0	112.2	3.5	1,368.3
		1,000		2.1	21.7	176.8	437.3	732.2	79.5	1.7	1,451.4
		2,000			3.0	35.0	84.4	136.4	9.0	5.4	273.2
		2,000				9.9	16.2	7.76	3.3	0.5	124.2
		10,000									
		15,000									
		20,000									
		25,000									
		Total	0.5	11.8	46.5	268.3	941.6	1,733.3	203.9	11.1	3.217.0
Transference Supplement	ALL COMPANIES OF	Stranger State State of the Control	Water with particular						The State of the S	ENGINEERING STATE	STATE STATE OF THE PARTY OF THE

		Total	0.5	11.8	46.5	268.3	941.6	1, 733.3	203.9	11.1	3,217.0	
MMM	11E	<del>,</del>		Equivalent Airspeed - VE (Knots) W -	Airspeed	- VE (Kn	lots) W - 1	13,000 lb				
		(Feet)	Below	75	100	125	150	175	200	225	Total	
		0	0.4	7.7	21.4	111.8	769.4	930.4	93.5	6.7	1,941.2	
		1,000			15.6	183.9	498.0	671.6	67.7	3.1	1,439.9	
		2,000			1.1	42.2	105.3	81.4	11.6	1.3	243.0	
		5,000			1.2	2.5	31.1	83.1			118.0	
		10,000										
		15,000										
		20,000										
		25,000										
		Total	0.4	7.7	39.3	340.3	1,403.8	1,766.5	172.9	11.2	3,742.0	
MMW	115	<u>+</u>		Equivalent Airspeed	Airspeed	1	VE (Knots) W -	14,000 lb				
		(Feet)	Below	75	100	125	150	175	200	225	Total	
		0	0.5	3.9	7.7	19.2	153.5	279.9	36.8	1.7	503.0	
		1,000		0.2	4.6	22.6	96.1	158.6	21.6	0.1	303.8	
		2,000			1.0	17.4	35.7	22.9	6.0		77.9	
		5,000					4.9	18.9			23.8	
		10,000										
		15,000										
		20,000										

1	a1	0.	ω.	6.	<b>∞</b>					S.			8	2	<b>&amp;</b>	0					2
	Total	503.0	303.8	77.9	23.8					908.5		Total	3,915.3	3,385.7	619.8	266.0					8, 186. 7
	225	1.7	0.1							1.8		225	12.0	4.9	6.8	0.5					24.2
	200	36.8	21.6	6.0						59.3		200	243.9	174.3	21.5	3.3					443.0
i4,000 lb	175	279.9	154.6	22.9	18.9					480.4	Weights	175	2,040.4	1,644.4	254.4	199.7					4, 138.9
Equivalent Airspeed - VE (Knots) W - 14,000 lb	150	153.5	96.1	35.7	4.9					290.1	Equivalent Airspeed - VE (Knots) All Weights	150	1,341.4	1,096.0	234.8	52.3					2,724.4
id - VE (K	125	19.2	22.6	17.4						59.2	ed - VE	125	185.9	412.7	97.2	9.1					704.9
nt Airspee	100	7.7	4.6	1.0						13.3	ent Airspe	100	61.1	49.7	5.1	1.2					117.1
Equivale	75	3.9	0.2							4.1	Equival	75	29.3	3.5							32.8
	Below	0.2								0.5		Below	1.4								1.4
Alt	(Feet)	0	1,000	2,000	5,000	10,000	15,000	20,000	25,000	Total	<b>*</b> I*	(Feet)	0	1,000	2,000	5,000	10,000	15,000	20,000	25,000	Total
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Alt		Equivale	nt Airspeed	Equivalent Airspeed - VE (Knots) W - 11,000 lb	ots) W - 11	, 000 lb			
(Feet)	Below	75	100	125	150	175	200	225	Total
0		0.2	5.6	6.0	0.1	0.1	0.3		4.2
1,000				0.1	9.2	3.8			13.1
2,000			7.5	4.4	17.2	6.1			35.2
5,000									
15,000									
20,000									
25,000									
Total		0.5	10.1	5.5	26.4	6.6	0.3		52.5
		Equivale	Equivalent Airspeed	d - VE (Knots) W -		12,000 lb			
Ait (Feet)	Below	75	100	125	150	175	200	225	Total
0	0.1	9.9	11.6	5.6	29.0	9.3	1.9		64.2
1,000		2.3	67.3	65.0	134.1	87.4	17.3	0.4	373.9
2,000		2.5	49.1	100.8	198.8	142.6	0.99	1.6	561.5
5,000				10.0	36.7	44.8	3.0		94.5
10,000					12.7	1.9			14.6
15,000									
20,000									
25,000									
Total	0.1	11.5	128.1	181.4	411.4	286.0	88.2	2.1	1,108.7

	25,000									
	Total	0.1	11.5	128.1	181.4	411.4	286.0	88.2	2.1	1, 108.7
MMW 12E	<b>V</b>		Equivale	Equivalent Airspeed -		VE (Knots) W - 13	13,000 lb			
	(Feet)	Below	75	100	125	150	175	200	225	Total
	0	0.5	11.5	27.4	26.4	71.8	90.2	8.9	0.7	235.3
	1,000		0.4	39.4	78.9	189.2	194.5	24.2	2.7	529.3
	2,000			29.9	103.4	382.9	313.7	94.4	0.2	924.5
	2,000				42.5	74.0	248.3	15.0		379.7
	10,000				2.1	56.7	4.9			63.8
_	15,000									
	20,000									
	25,000									
	Total	0.5	12.0	7.96	253.3	774.6	851.7	140.3	3.5	2, 132. 7
MMW 12F	<b>+</b>		Equivale	Equivalent Airspeed	•	VE (Knots) W - 14	14,000 lb			
	(Feet)	Below	75	100	125	150	175	200	225	Total
	0		5.0	10.3	16.0	16.2	23.8	4.1		75.3
	1,000		0.5	4.6	41.7	7.67	36.2	1.1		163.8
	2,000			25.7	46.1	258.2	133.6	8.8		472.4
	2,000				2.8	11.6	13.8	0.5		28.7
	10,000				1.1	7.4	5.1			13.6
	15,000									

- 1

20,000

75.3	163.8	472.4	28.7	13.6				753.9		Total	379.0	1,080.2	1,993.6	503.0	91.9				4,047.7
										225	0.7	3.2	1.8						5.6
4.1	1.1	8.8	0.5					14.4		200	13.1	42.6	169.2	18.4					243.2
23.8	36.2	133.6	13.8	5.1				212.5	Veights	175	123.4	321.9	296.0	306.9	11.9				1,360.1
16.2	7.67	258.2	11.6	7.4				373.1	- VE (Knots) All Weights	150	117.2	412.2	857.0	122.3	8.92				1,585.5
16.0	41.7	46.1	2.8	1.1				107.7	ed - VE (F	125	48.8	185.8	254.7	55.3	3.3				548.0
10.3	4.6	25.7						40.7	Equivalent Airspeed	100	51.8	111.4	112.3						275.5
5.0	0.5							5.5	Equival	75	23.4	3.2	2.5						29.1
										Below	9.0								9.0
0	1,000	2,000	5,000	10,000	15,000	20,000	25,000	Total	<b>4</b> 1	(Feet)	0	1,000	2,000	2,000	10,000	15,000	20,000	25,000	Total
									4 12										
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Total

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(Feet) Below

TIME FOR ALTITUDE VERSUS AIRSPEED

COMP				Equivale	nt Airspee	ivalent Airspeed - VE (Knots)	nots)			
	Alt (Feet)	Below	75	100	125	150	175	200	225	Total
	0	2.0	52.6	112.9	234.7	1,458.5	2, 163.8	257.0	12.7	4,294.2
	1,000		6.7	161.1	598.5	1,508.2	1,966.4	216.9	8.1	4,465.9
	2,000		2.5	117.4	351.9	1,091.8	850.3	190.7	8.6	2,613.4
	5,000			1.2	64.4	174.6	9.905	21.7	0.5	0.697
	10,000				3.3	76.8	11.9			91.9
	15,000									
	20,000									
	25,000									
	Total	2.0	61.9	392.7	1,252.9	4,309.9	5,499.0	686.2	29.8	12,234.4

Total	Delta nz		169	173	344	102.8			Total	Delta n <sub>z</sub>							200	213			413	190.6
335	and	Above							225	and Above												
000	200 to	677	4	44	œ	1.4	, 000 lb	(8	200	to 225							14	13			27	5.5
176	to 200	0	152	148	302	63.1	eet W - 11	- VE (Knots	175	to 200							86	106			204	82.0
031	150 to	6,1	13	50	33	14.9	Altitude - 1,000 to 2,000 Feet W - 11,000 lb	Equivalent Airspeed - VE (Knots)	150	to 175							80	84			164	64.6
136	to to	061				5.0	nde - 1,000	Equivalen	125	to 150							∞	6			17	29.4
001	to 1	671				10.1	Alti		100	to 125								1			7	6.7
7.5	to 1			-	1	8.0			75	to 100												1.2
2 0 0 I	Less Than	2				0.3			Less	Than 75												
Load	ractor Delta n <sub>z</sub>	e 3. to 3. to 2.	1. 75 to 2. 25 1. 25 to 1. 75 0. 75 to 1. 25 0. 25 to 0. 75	-0. 75 to -0. 25 -1. 25 to -0. 75 -1. 75 to -1. 25 -2. 25 to -1. 75 Below -2. 25	Total	Time (Min)			Factor	Delta $n_{\mathbf{z}}$	<del>ب</del> ،	3. 25 to 3. 75	to 5.	to 2.	to 1.	to 1.	0.25 to 0.75	-0-	-1.25 to -0.75	 Below -2.25	Total	Time (Min)
							11CB															

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413	190.6		Ē	lotai	Delta n,	1						6	~	)				12	25.7			i	Total	Dolts	Della liz						2	1,685	1,522				3, 209
				225	and	Above																	Ċ	577	Above						;	11	11				22
27	5.5	, 000 15	s)	200	to	525														41 000		~	6	700	225						(	283	250				533
204	82.0	Altitude - 2,000 to 5,000 Feet W - 11,000 lb	Equivalent Airspeed - VE (Knots)	175	to	200													13.6	0 to 1 000 Feet W = 12 000 lb	:	Equivalent Airspeed - VE (Knots)		175	200						7	1,019	932				1,953
164	64.6	00 to 5,000 I	nt Airspeed	150	to	175						6	ĸ	1				12	9.3	0 to 1 000 E		nt Airspeed		150	175						C C	339	310				649
17	29.4	tude - 2,00	Equivale	125	to	150													2.7	Altitude -		Equivale		125	150						00	67	14				43
~	7.9	Alti		100	0,	125														Alti			00.	50	125						4	•	2				6
	1.2			75	to	100																	ŗ	ς <b>t</b>	100			•									
				Less	Than	75																	-	Than	75												
Total	Time (Min)			Load Factor	Delta n,	1	5. 25 to 3. 75 2. 75 to 3. 25	to 5.	75 to	to l.	to 1.		-0.75 to -0.25	-0	-1.75 to -1.25	-2. 25 to -1. 75	Below -2.25	Total	Time (Min)			•	Load	Factor Delta n	Della 112	в 3.	to 3.	2.75 to 3.25	3 5	to :	to 1.	0	o 0	-1. 25 to -0. 75 -1. 75 to -1. 25	-2. 25 to -1. 75	Below -2.25	Total
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3, 209	1, 368. 3		E	Total	Delta $n_z$					1,391	1, 328				2, 721	1,451.4				Total	Delta n,						55	1	<b>1</b>		
22	3.5			225	and	2000				2					2	1.7				225	and	Above					-	-	•		
533	112.2	, 000 15	<u>.</u>	200	to					77	100				177	79.5		, 000 15	•	200	to	225					4	,	J		
1,953	767.0	eet W - 12	- VE (Knots	175	to	2			,	921	892				1,815	732. 2		eet W - 12	- VE (Knots	175	to	200					37	9	ř		
649	403.7	Altitude - 1,000 to 2,000 Feet W - 12,000 lb	Equivalent Airspeed - VE (Knots)	150	to 175					308	282				290	437.3		Altitude - 2,000 to 5,000 Feet W - 12,000 lb	Equivalent Airspeed - VE (Knots)	150	to	175					6	-			
43	49.9	ude - 1,00	Equivale	125	to					83	51				134	176.8	•	ude - 2,00	Equivale	125	to	150					·M	_	•		
6	21.8	Altit		100	to 125	3					3				3	21.7	;	Altit		.100	to	125					-				
	9.7			75	to											2.1				75	to	100									
	0.5			Less	Than	2														Less	Than	75									
-1. (5 to -1. 25 -2. 25 to -1. 75 Below -2. 25 Total	Time (Min)		T C C	Factor	Delta $n_{\mathbf{Z}}$	Above 3.75	, w.	, v	Η.	0.75 to 1.25 0.25 to 0.75	-0.75 to -0.25	-1.25 to -0.75	-1. 75 to -1. 25 -2. 25 to -1. 75	Below -2.25	Total	Time (Min)			700	Factor	Delta $n_{\mathbf{z}}$	•	Above 3.75	ň ~	7	1.25 to 1.75	0.25 to 0.75	-0 75 to -0 25	-1. 25 to -0. 75	-1.75 to -1.25	-2. 25 to -1. 75
		11DB																1100													
		MMWA									1	•						MMWA													

ì	1				,																													
2, 721	1, 451. 4		£	lotai	Delta n <sub>z</sub>					55	57				112		273.2		,	Total		Delta n <sub>z</sub>						2	-	•			ĸ	
2	1.7			225	and	3000					-				2		5.4				225	and Above												
177	79.5	, 000 lb	8)	200	to	627				4	2				9		9.0	2,000 1b	(8		200	to 225												
1,815	732. 2	eet W - 12	- VE (Knots	175	to					37	40				77		136.4	Feet W - 1	- VE (Knots		175	to 200												
290	437.3	0 to 5,000 F	Equivalent Airspeed - VE (Knots)	150	to	<u> </u>				6	13				22		84.4	0 10 10,000	Equivalent Airspeed - VE (Knots)		150	to 175						-	-	•			2	
134	176.8	titude - 2,000 to 5,000 Feet W - 12,000 lb	Equivaler	125	to					3	-				4	d	35.0	Altitude - 5,000 to 10,000 Feet W - 12,000 lb	Equivaler		125	to 150						-					-	
3	21.7	Alti		100	to	j				7					-		3.0	Alti			100	to 125												
	2. 1			75	to																75	to 100												
				Less	Than	2															Less	Than 75												
Total	Time (Min)		7	Factor	Delta $n_{\mathbf{z}}$	Above 3.75	2	۲.	0.75 to 1.25	0	-0.75 to -0.25	-1.25 to -0.75	<u>-</u> ;	-2. 25 to -1. 75	Below -2.25 Total		Time (Min)		,	Load	Factor	Delta $n_{\mathbf{Z}}$	3	m r	 1.75 to 2.25	i -:	0.75 to 1.25	0	-0. 75 to -0. 25	-1.25 to -0.75	-1.75 to -1.25	•	below -2.25 Total	
		11DC																11DD																
		MMWA												1	•			MMWA																

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MMWA

2,809		1,439.9			Total		Delta $n_z$								91	σα	63				081	) 1	243.0				Total		Delta n <sub>z</sub>							674	563	
		3.1				225	and Above																1.3					225	and	Above							1	
153		67.7	, 000 15	(9		200	to 225								-	4	۲				ır	,	11.6		000 lb			200	to 225	677						62	39	
262.1	17 1 67	671.6	eet W - 13	- VE (Knots		175	to 200	)							48	84	P				96	<u> </u>	81.4		et W - 14,	VE (Knots)		175	to 200	007						450	389	
743	C# /	498.0	Altitude - 2,000 to 5,000 Feet W - 13,000 lb	Equivalent Airspeed - VE (Knots)		150	to 175	1							35	ያ					7.0	<b>,</b>	105.3		0 to 1,000 Feet W - 14,000 lb	Equivalent Airspeed - VE (Knots)		150	to 175	6)1						135	123	
011	110	183.9	nde - 2, 00	Equivaler		125	to 150	)							7	2	ı				o		42.2			Equivalent		125	to 150	001						9	10	
4	٥	15.6	Altit			100	to 125																1.1		Altitude -			100	to 125	(7)						4	-	
						75	to 100	) )																				75	to 100	001								
						Less	Than 75	)																				Less	Than 75	2								
-1. 75 to -1. 25 -2. 25 to -1. 75 Below -2. 25	Total	Time (Min)			Load	Factor	Delta $n_z$	Above 3.75	0 3.	75 to 3.	25 to 2.	to 2.	25 to 1.	to	to 0.	-0. 75 to -0. 25	-1.25 to -0.75	1 75 to 1 35	-2 25 40 -1 25	-2. 25 to -1. 75 Relow -2 25	Total		Time (Min)				Load	Factor	Delta n <sub>z</sub>	Above 3.75	0 3.	to 3.	to 2.	1.75 to 2.25	to 1.	to 0.	-0.75 to -0.25	-1. 25 to -0. 75
			HEC																					1	IIFA													
			MMWA																						MMWA													
																						_																

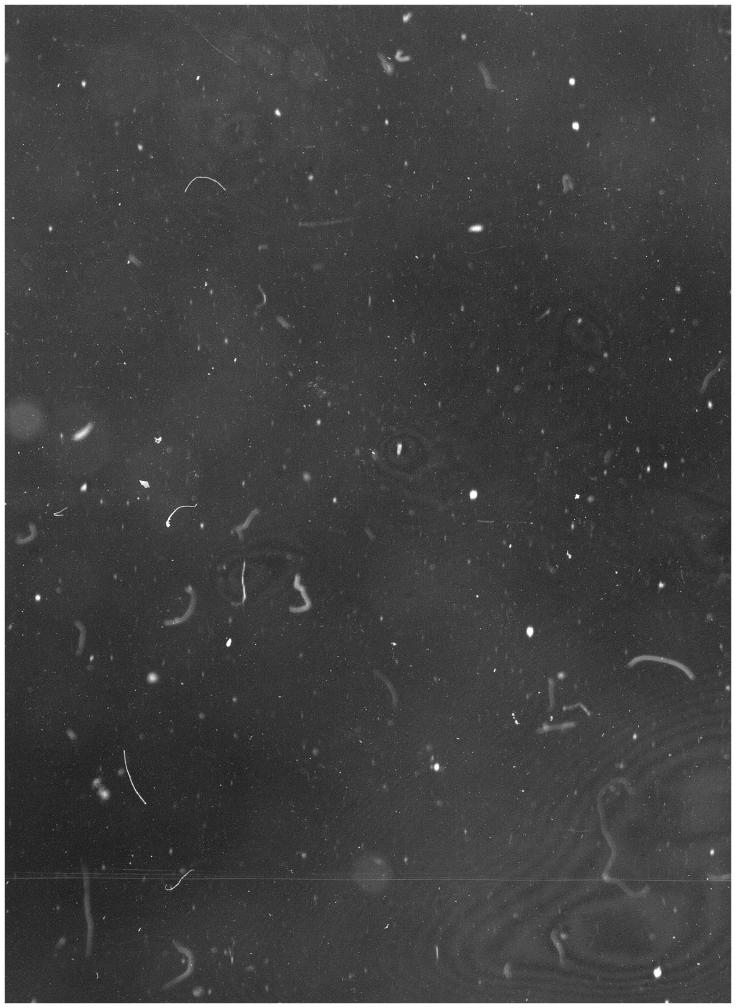
		0. 25 to 0. 75 -0. 75 to -0. 25			4 -	9 10	135	450	39	-	674	
		-1. 25 to -0. 75 -1. 75 to -1. 25 -2. 25 to -1. 75 Below -2. 25			u	71	0 10	000	C	-		
		Time (Min)	6	6	, r	0 7	867	626	118	<b>→</b> t	1, 257	
		i ime (win)		6.6		19.5	153.5	6.617	30.8	l. /	503.0	
MMWA	IIFB				Alti	tude - 1,00	0 to 2,000 ]	Altitude - 1,000 to 2,000 Feet W - 14,000 lb	l, 000 lb			
		**************************************				Equivale	nt Airspeed	Equivalent Airspeed - VE (Knots)	s)		Ę	
		Factor	Less	75	100	125	150	175	200	225	lotai	
			1 nan 75	100	to 125	to 150	to 175	to 200	to 225	and Above	Delta n <sub>z</sub>	
		ove 3. 25 to 3.										
ļ		<u>ښ</u> ر										
		2. 25 to 2. 75 1. 75 tc 2. 25										
)		25 to 1.										
		0. 25 to 0. 75			Т	7	30	89	15		142	
		-0.75 to -0.25				6	32	104	-		146	
		-0-										
		-1.75 to -1.25 -2.25 to -1.75										
		Total			-	16	29	193	16		288	
		Time (Min)		0.2	4.6	22.6	96. 1	158.6	21.6	0.1	303.8	
MMWA	11FC				Alti	tude - 2,00	0 to 5,000 ]	Altitude - 2,000 to 5,000 Feet W - 14,000 lb	t, 000 1b			
		,				Equivale	nt Airspeed	Equivalent Airspeed - VE (Knots)	s)			
		Load	1	7.	001	1 26	9	1	ć		Total	
		r actor Delta n <sub>z</sub>	Less Than	to	to 1.25	1.25 to	150 to	175 to	200 to	90e	Delta n <sub>z</sub>	
		Above 3.75	2	20	(3)	001	0.1.1	007	677	3.000v.e		
		25 to 3.										
		5 3										
		to l.					c	č				

303.8			Total	Delta n <sub>z</sub>		ιΛ	4	6	6.77	E	Delta n <sub>z</sub>		15 8, 311	7,608	15, 939	8 186 7
0.1			225	and Above							225 and Above		15	15	30	24. 2.
21.6	, 000 15	<b>~</b>	200	to 225		~		~	6.0	All Weights	200 to 225		682	577	1, 260	443.0
158.6	eet W - 14	- VE (Knots	175	to 200		7	4	Ò	22. 9		175 to 200		15	4,953	10, 207	4.138.9
96. 1	Altitude - 2,000 to 5,000 Feet W - 14,000 lb	Equivalent Airspeed - VE (Knots)	150	to 175		2		7	35.7	Equivalent Airspeed - VE (Knots)	150 to 175		2, 085	1,876	3, 961	2, 724, 4
22.6	tude - 2, 000	Equivaler	125	to 150					17.4	ivalent Airs	125 to 150		276	170	446	704.9
4.6	Alti		100	to 125					1.0	пbЭ	100 to 125		18	16	34	117.1
0.2			75	100							75 to 100				-	32.8
			Less	Inan 75							Less Than 75					1.4
Time (Min)		7 1	Factor	Deila nz	e 3. to 3. to 3. to 2. to 2.	0.75 to 1.25 0.25 to 0.75		Below -2.25 Total	Time (Min)	J. Oad	Factor Delta n <sub>z</sub>	Above 3, 75 3, 25 to 3, 75 2, 75 to 3, 25 2, 25 to 2, 75 1, 75 to 2, 25	to 1. to 0.	0 0 0 0	Below -2.25 Total	Time (Min)
	HEC									1.1						
	MMWA									MM						

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MMWA 12CA				Alti	Altitude -	0 to 1,000 Feet W - 11,000 lb	eet W - 1]	, 000 lb		
	Load				Equival	Equivalent Airspeed - VE (Knots)	- VE (Kno	ts)		Total
	Factor	Less	75	100	125	150	175	200	225	1000
	Delta nz	Than	t to	to	to	to	to	ot rec	and	Delta nz
	to 3.	2	3			2	2	677	900V	
	2. 75 to 3. 25 2. 25 to 2. 75									
	2									
	to 1.									
	to 1.									
	to 0.			-			1			2
	-0.75 to -0.25							7		2
	-1.25 to -0.75									
	-1.75 to -1.25									
	Below -2.25									
	~			-			7	7		4
	Time (Min)		0.2	2.6	6.0	0.1	0.1	0.3		4.2
MMWA 12CB				Alti	tude - 1,00	Altitude - 1,000 to 2,000 Feet W - 11,000 lb	eet W - 11	l, 000 lb		
	T - 1				Equival	Equivalent Airspeed - VE (Knots)	- VE (Kno	ts)		į
	Factor	Less	75	100	125	150	175	200	225	Total
	Delta nz	Than	2	<b>5</b>	t (	£ 2	t t	t (	and	Delta n.
	1	75	100	125	150	175	200	225	Above	N
	<u>ښ</u> ،									
	2, 75 to 3, 25									
	; c									
	: :									
	to 1.									
	-0.75 to -0.25					1				-
	-1.25 to -0.75									
	-1.75 to -1.25									
	-2. 25 to -1. 75									
						-				1
	i									
	Time (Min)				0.1	9.2	3.8			13.1

1	13.1			lotal	Delta n <sub>z</sub>								2						2	35.2			Total		$\dot{D}$ elta n $_{z}$							73	44
				225		Above																				Above							
		, 600 lb	ts)	200	to	225															41 000 41 000	(S)		200	to 225	677						14	8
	3, 8	et W - 11	- VE (Kno	175	t ;	200														6. 1	M - 12	- VE (Knot		175	to So	200						33	23
1	9.2	Altitude - 2,000 to 5,000 Feet W - 11,000 lb	Equivalent Airspeed - VE (Knots)	150	t t	175														17.2	0 to 1,000 Feet W - 12,000 lb	Equivalent Airspeed - VE (Knots)		150	to 175	C/I						22	11
	0.1	ude - 2, 00	Equival	125	9	150							7						2	4.4		Equival		125	to E	061						6	2
		Altita		100	<b>\$</b>	125														7.5	Altitude -			100	to 125	671						-	
				75	to :	100																		75	] [	2							
				Less	Than	75																		Less	Than 75	2							
-1.75 to -1.25 -2.25 to -1.75 Below -2.25 Total	Time (Min)		£00.]	Factor	Delta $n_z$	c	า๋ ๓๋	<b>\$</b> .	, i	8 5 9 7	: -	2	0. 25 to 0. 75	20 0 20	-0. (5 to -0. 25	-1 75 to -1 25	-2. 25 to -1. 75	Below = 2, 25	Total	Time (Min)		,	Load	Factor	Delta n <sub>z</sub>	Above 3.75	to 3.	2	Ş	to	<b>\$</b>	0.25 to 0.75	-0. 75 to -0. 25
		12CC																			12DA												
		MMWA																			MMWA												
																			E														



	le	6	2 u 1									73	44	•				117	1.	64.2			al al		n,	1								380	176	101	7			742		6:
	Total	2	Della nz																7	64			Total		Delta nz									en.	,	<b>n</b>				7		373.9
	325	C77	Above	1																				225	and	Above																0.4
ts)	200	207	225									14	α	þ				22	77	1.9	, 000 1ь	s)		200	to	225								58	*	*		•		102		17.3
- VE (Kno	175	<u>;</u>	200								Į,	33	23	)				74	00	9.3	eet W - 12	- VE (Knot		175	to	200								159	031		4			319		87.4
Equivalent Airspeed - VE (Knots)		5	175								4	22	11					11	n n	29.0	Altitude - 1,000 to 2,000 Feet W - 12,000 lb	Equivalent Airspeed - VE (Knots)	1	150	ţ	175								136	134	¥01				270		134.1
Equivale	125	9	150								,	m	7					ιſ	1	5.6	ude - 1,000	Equivale		125	to	150								24	02	ì				44		65.0
	1 00	to	125								•	-						_	•	11.6	Altit			100	to	125								3	4	•				2		67.3
	75	; ;	100																	9.9		,		75	ţ	100																2.3
	Less	Than	75																	0.1				Less	Than	75																
	Load Factor	Delta n,	7	Above 3,75	to 3.	75 to 3.	2	1.75 to 2.25	to 1.	75 40 1	•	9	-0.75 to -0.25		-	7	Below -2.25	tal		Time (Min)			Load	Factor	Delta nz		3.	to 3.	75 to 3.	to 2.	to 2.	25 to 1.	to 1.	0.25 to 0.75	-0. 75 to -0. 25	9	-1. 75 to -1. 25	-2. 25 to -1. 75	Below -2.25	tal	i	Time (Min)
																					12DB																					
																					MMWA																					

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MMWA	12DC				Alti	tude - 2, 0(	Altitude - 2,000 to 5,000 Feet W - 12,000 lb	eet W - 12	, 000 lb	
		Load				Equival	Equivalent Airspeed - VE (Knots)	1 - VE (Kno	(s)	
		Factor	Less	75	100	125	150	175	200	
		Delta n <sub>z</sub>	Than	ţ	to	to	to	ţ	\$	
		A h 0 3 7 5	75	100	125	150	175	200	225	
		3 25 to 3 75								
		י ר								
		ำ เ								
		7								
		1.75 to 2.25								
		-								
		_								
		0.25 to 0.75				23	73	73	24	
		-0.75 to -0.25				21	56	53	4	
									1	
		_								
		_								
		Below -2.25								
		Total				44	129	126	38	
		Time (Min)		2.5	49.1	100.8	198.8	142.6	0.99	
MWWA	12EA				Alti	Altitude -	0 to 1,000 F	0 to 1,000 Feet W - 13,000 lb	, 000 lb	
		Load				Equival	Equivalent Airspeed - VE (Knots)	1 - VE (Kno	(8:	
		Factor	Less	75	100	125	150	175	200	
		Delta nz	Than	to	ţ	to	ţ	ţ	ţ	
			75	100	125	150	175	200	225	
		Above 3.75								
		_								
		_								
		_								
		1.75 to 2.25								
		2 2			•	26	ć	1	r	
					ť	<b>\$</b> 7	07	n	2	

Delta n<sub>z</sub>

225 and Above

Total

58

22

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46

104

235.3

0.7

8.9

90.2

26.4

27.4

11.5

0.5

Time (Min)

42

38

2

-0.75 to -0.25 -1.25 to -0.75 -1.75 to -1.25 -2.25 to -1.75 Below -2.25 Total

561.5

1.6

342

2

Delta  $n_{\mathbf{z}}$ 

225 and Above

Total

961

						7.53	** , _	51100	Office May May		P) 75@	177 m anay	phy har has a					na 3447/34/84/88	nmpks.	1994 / Par	ing of the	-	-	-							•					*		M E
46	m,			-4	zu							ļ	ĩυ					9		3						$\mathbf{z}_{\mathbf{l}}$								6	7			
31	235.3		E	Total	Delta $n_{\mathbf{z}}$							1	275	172	i			546	,	529. 3				Total		Delta $n_{\mathbf{z}}$								199	137	}		
4	0.7			225	and	Above						•	2					2		2.7					225	and	Apove											
e .0	8.9	- 13, 000 lb	(8:	200	to	<b>C77</b>							33	23				26		24. 2	000 15		s)		200	to 22.	<b>677</b>							30	30	}		
9 6	90.2	eet W - 13	- VE (Knot	175	to 200	007						•	118	117				235		194.5	eet W - 13.		- VE (Knots)		175	to So	2							111	29			
22 24	71.8	to 2,000 F	Equivalent Airspeed - VE (Knots)	150	to 175							,	104	111				215		189. 2	to 5, 000 F		Equivalent Airspeed		150	to 175	?							38	30			A CONTRACTOR OF THE PERSON NAMED IN
<b>4.</b> 86	26.4	Altitude - 1,000 to 2,000 Feet W	Equivale	125	ن 15							-	0	17				27		78.9	Altitude - 2,000 to 5,000 Feet W - 13,000 lb		Equivalen		125	to 150								70	10			
	27.4	Altit		100	to 125	}						r	η.	e				9		39.4	Altit			į	100	5 7.												
	11.5			75	100 100	3														0.4				ļ	5 ;	g <u>S</u>												
	0.5			Less	Than 75	?																			Tess	Inan 75	!											COMMENT OF THE PERSON NAMED IN
-0.75 to -0.25 -1.25 to -0.75 -1.75 to -1.25 -2.25 to -1.75 Below -2.25	Time (Min)		Load	Factor	Delta nz	3	<del>ب</del>	. t	2. 25 to 2. 75	1. 25 to 1. 75		; <	; 3	-0.75 to -0.25	-1.25 to -0.75	-1.75 to -1.25	-2. 25 to -1. 75 Relow -2 25	tal		Time (Min)				Load	Factor Dolta	Zu Bliad	Above 3.75	25 to 3.	e,	7	to 2.	<b>9</b>	<b>:</b> (	to 0.	ವಿ	Ş	-1.75 to -1.25	2
		12EB																			12EC																	
		MWWA														1					MMWA																	

Load				Equivale	nt Airspeed	Equivalent Airspeed - VE (Knots)	ts)		Total
Factor	Less	75	100	125	150	175	200	225	1
Delta $n_z$	Than	\$	ಭ	to	ţ	ţ	ţ	pue	Delta nz
	75	100	125	150	175	200	225	Above	1
3.75									
7									
<u>-</u>									
<b>:</b>									
to 0.75				20	38	111	30		199
-0.75 to -0.25				10	30	29	30		137
-1.25 to -0.75									· )
1. 25									
5 -1.75									
Below -2.25									
Total				30	89	178	09		336
Time (Min)			29.9	103.4	382.9	313.7	94.4	0.2	924. 5
			Altin	tude - 5, 000	) to 10,000	Altitude - 5,000 to 10,000 Feet W - 13,000 lb	3,000 lb		
				Equivale	Equivalent Aireneed	I VE (Knote)	1	•	
Load									Total
Factor	Less	75	100	125	150	175	200	225	
Delta $n_z$	Than	ţ;	<b>t</b>	to	\$	ţ	ţ	and	Delta nz
	(2)	100		150	175	200	225	Above	l
0, 10									
• •									
i ~									
i -									
0.75 to 1.25									
to 0.75					2	17			19
-0.75 to -0.25					o	76			36
-1. 25 to -0. 75					•	3			C C
-1.75 to -1.25									
-2. 25 to -1. 75									
Below -2.25									
Total					11	43			54
Time (Min)				42.5	0.47	248 3	7.		270 7
<b>'</b>				ì	> #	C.04.7	70.0		517.1

-2. 25 to -1. (5 Below -2. 25

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Altitude -
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5.0 10.3
Altitude - 1,000 to 2,000 Feet W - 14,000 lb
75 100 to to 100 125
0.5 4.6

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D. <b>XO</b>	148	163.8		F	Total	Delta n <sub>z</sub>						57	8				156	477 4				Total		Delta nz						15	12		
					225	and																	225	and Above	) )								
	2	1.1	i, 000 1b	(8:	200	to 225												œ		4, 000 lb	(9)		200	to 225	1				(	7	1		
	33	36.2	eet W - 14	- VE (Knots)	175	to 200						21	34			11	55	133.6	)   	feet W - 1	- VE (Knots)		175	to 200					(	6	10		
	104	79.7	) to 5,000 F	Equivalent Airspeed	150	to 175	1					33	63				96	258. 2		to 10,000 1	Equivalent Airspeed	•	150	to 175					•	4	-		
	6	41.7	Altitude - 2, 000 to 5, 000 Feet W - 14, 000 lb	Equivale	125	to 150	<u>}</u>					m	2	1			ĸ	46. 1		Altitude - 5,000 to 10,000 Feet W - 14,000 lb	Equivalen	1	125	to 150									
		4.6	Alti		100	to 125												25. 7		Altit			100	to 125									
		0.5			75	to 00																	75	100 100									
					Less	Than 75																	Less	Than 75									
-1. 25 to -0. 75 -1. 75 to -1. 25 -2. 25 to -1. 75	Total	Time (Min)		Load	Factor	Delta $n_{\mathbf{z}}$	Above 3.75	, w	2.25 to 2.75	, -	: -: : ::	o.	-0.75 to -0.25	9	-1.75 to -1.25	-2. 25 to -1. 75	Total	Time (Min)				Load	Factor	Delta nz	e,	ี คำ	n 0	1.75 to 2.25	નં લ	ရ	0	-1. 25 to -0. 75	
,			12FC																	12FD													
			MWWA																	MMWA													

Less s	~	75	100	Equivale	ent Airspeed 150	Equivalent Airspeed - VE (Knots) 125 150 175	200	225	Total
Than to 75 100	٥ ٥		to 125	to 150	to 175	to	to	and	Delta $n_z$
					2	8	677	Above	
					4	6	7		15
					1	. 10	-		12
					ĸ	19	ю		7.2
				2.8	11.6	13.8	0.5		28.7
			2	· · · · · · · · · · · · · · · · · · ·	7	1 7 7 7			
			mba	valent Alri	크^ - paeds	Equivalent Alrapeed - VE (Knots) All Weights	Weights		Total
75		•	100	125	150	175	200	225	
1 han to 75 100	٥		to 125	to 150	to 175	to 200	to 225	and Above	Delta nz
				•					
			12	110	1 476	564	164	14	1 1, 340
			6	<b>4</b> 6	504	517 1	127	8	1, 253 1
			21	204	981	1,082	291	16	2, 595
0.6 29.1			275.5	548.0	1, 585.5	1, 360. 1	243. 2	5.6	4,047.7

Below -2.75

C

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TABLE IX
DELTA no VERSUS AIRSPEED

				DELTA nz	DELTA n <sub>z</sub> VERSUS AIRSPEED	IRSPEED				
COMP			1	Equivalent	Equivalent Airspeed - VE (Knots)	VE (Knots)				
	Load									Total
	Factor	Less	75	100	125	150	175	200	225	
	Delta nz	Than	ţ	ţ	to	ţ	ţ	ţ	and	Delta nz
	1	75	100	125	150	175	200	225	Above	
	Above 3.75									
	2.75 to 3.25									
	2									
	1.75 to 2.25									
	1.25 to 1.75									
	0.75 to i.25					-	15			16
	0.25 to 0.75			30	386	2,561	5,799	846	53	9,651
	-0.75 to -0.25		7	25	264	2,380	5,470	704	17	8,861
	-1.25 to -0.75						5	1		9
	-1.75 to -1.25									
	-2.25 to -1.75									
	Below -2.25									
	Total		7	52	650	4,942	11,289	1,551	46	18,534
	Time (Min)	2.0	61.9	392.7	1,252.9	4,309.9	5,499.0	686.2	8.62	12,234.4

MMWA

	F C+	10141	nz			,	1	1 2	14	221	94			338	102.8			Total	£	Z			e	2	ιn	20	317	110				457	190.6
		225	and	Above														200	pue	Above													
		200	ಭ	225				۲۰	) <b>-</b>	4				<b>∞</b>	1.4			000	S 4	225			m	)		٣	10	9				22	5.5
1b		175	ţ	200		,	-	<b></b> ~		120	7.7			506	63.1	o 1b		17	t t	200				2	٣	9	118	53				182	82.0
W - 11,000 lb	- VE (Knots)	150	to	175				-	9	45	12			64	14.9	Altitude - 1,000 to 2,000 Feet W - 11,000 lb	Equivalent Airspeed - VE (Knots)	150	to t	175					-	ro i	108	40				154	64.6
0 to 1,000 Feet W	rspeed - 1	125	\$	150						18	3			21	5.0	2,000 Fee	rspeed - 1	126	t t	150					ī	9 ;	64	10				81	29.4
- 0 to 1,	Equivalent Airspeed	100	to	125						28				28	10.1	1,000 to	valent Air	001	ş	125						!	17	-				18	7.9
Altitude -	inp3	75	<b>t</b>	100						9	2			<b>∞</b>	8.0	ltitude -	Equi	7	£ 5	100													1.2
		Less	Than	75											0.3	Ä		1	Than	75													
	Load	Factor	u <sup>z</sup> u	Above 4.75	to 4.		٠ ب	2 2	5	1.25 to 1.75	0.25 to 0.75	-0.75 to -0.25	Below -1.25	Total	Time (Min)			Load	י מרנסו	Z.	<b>(1)</b>	9 9	3.25 to 3.75	ç	to	٥.	\$	0.25 to 0.75	-0.25 to 0.25	-0.75 to -0.25	-1.25 to -0.75 Relow -1.25	Total	Time (Min)
11CA																IICB																	

MMWA

	Time (Min)		1.2	7.9	29.4	64.6	82.0	5.5		190.6	
MMWA 11CC		Al	Altitude - 2	2,000 to 5	000 to 5,000 Feet W	. W - 11,000 lb	1 lb				
			Equiv	Equivalent Airspeed	1	VE (Knots)				Ē	
	Factor	Less	75	100	125	150	175	200	225	lotal	
	n <sub>z</sub>	Than 75	\$ £	to 125	to to	5 5	5 5	\$ £	and	$\mathbf{r}_{\mathbf{z}}$	
	Above 4.75	2	001	163	061	6/1	007	577	Above		
	2										
	2										
	2.75 to 3.25										
	2 2					1				_	
	2					ı m				• "	
	1.25 to 1.75				2	24	٣			32	
					-	-	'n			u	
S					1	•	1			n	
	-1.25 to -0.75 Below -1.25										
	ત્વ				9	29	9			41	
	Time (Min)				2.7	9.3	13.6			25.7	
MMWA 11DA		·	Altitude -		0 to 1,000 Feet W	' - 12,000 lb	م				
			Equiv	Equivalent Airspeed -		VE (Knots)					
	Load									Total	
	Factor	Less	75	100	125	150	175	200	225		
	z <sub>u</sub>	Than	<b>S</b> 5	5 5	\$ £	ដ ្	Ş	to	and	nz	
	Above 4.75	C	100	671	150	175	200	522	Above		
	٥						1	2		m	
	\$						7	1 00		10	
	3.25 to 3.75					-	<b>∞</b>	15	7	25	
	2					3	22	15	7	42	
	2					59	101	38	7	175	
	1.75 to 2.25		•		25		445	66	S.	754	
	Ş		10	30	129	1,667	2,887	385	01	5, 118	
	0.25 to 0.75		2	7	28	313	689	74	4	1, 117	
	-0.25 to 0.25						-		1	-	
	-0.75 to -0.25										
	-1.25 to -0.75										
	Below -1.25 Total		12	37	182	2, 193	4,156	989	53	7,245	
	Time (Min)	ני	0 7	21.8	40 0	403.7	0 242	112.2	~	1 360 3	
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Lancott D. S. S. Martin, T. C. Control of the State of th

	Total	Ē	N				Z.	46	328	3,667	850					4,897	1,451.4		ļ	lotal	\$	z						4 1	758	00.7	50					319	273.2	
	6	225 and	Above					2	7	9						10	1.7			225	י נ נ	Above							7	o						9	5.4	
	6	200 to	225				1	~	25	215	59					271	79.5			200	3	225							,	-	-					<b>∞</b>	9.0	
	;	175 to	200				2	16	145	1,732	464	-				2,360	732.2	116		175	2 4	200					į	2 -	2,21	134	17					158	136.4	
(Knots)		150 to	175				2	19	129	1,262	271					1,683	437.3	2,000 to 5,000 Feet W - 12,000 lb	(Knots)	031	201	175					,	<b>.</b>	T 0	60	19					80	84.4	
alent Airspeed - VE (Knots)		125 to	150					<b>∞</b>	27	405	77					517	176.8	, 000 Feet	alent Airspeed - VE (Knots)	125	14.	150						<b>⊢</b> '	1 77	<b>4</b> ,	12					09	35.0	
ralent Airs		100 to	125							44	<b>∞</b>					25	21.7	2,000 to 5	valent Air	001	100	125							7	0	1					7	3.0	
Equiv	i .	75 to	100							e	-					4	2.1	Altitude -	Equiv	7.6	2 ;	100			٠													
		Less	75															Alt		1	T	75																
	Load	Factor		Above 4.75	2	3.25 to 3.75	ţ		1.75 to 2.25	1.25 to 1.75	0.25 to 0.75	to 0.	1	-1.25 to -0.75	Below -1.25	Total	Time (Min)		,	Load	Factor	z u	4.	ţ	2	ţ		9	1.75 to 2.25	2		-0.25 to 0.25	,	-1.25 to -0.75	Below - 1.25	ત	Time (Min)	
																		11DC																				
																		MMWA																				

Time (Min)

273.2

136.4

84.4

35.0

273.2	o	Ē	lotal	n z	٥		13	32	124.2		Ę	1000	n	l I	6	29	36	118	637 7,364	1,264	9			9,501	1,941.2
5.4			225	and			-	-	0.5			225	and	1	8	20	S	<b>∞</b> (	27	∞				74	6.7
0.6			200	to 22.5	^	ı	<b>-</b>	٣	3,3			200	to 225		9	40	16	27	352	63	2			561	93.5
136.4	0 lb		175	to 200	<u>~</u>	2 .	10	23	7.76	م		175	to 200			7	14	63	3,578	919	3			4,648	930.4
84.4	Altitude - 5,000 to 10,000 Feet W - 12,000 lb	E (Knots)	150	to 175	~	<b>)</b>	-	æ	16.2	0 to 1,000 Feet W - 13,000 lb	E (Knots)	150	to 175					91	3, 120	496				3,837	769.4
35.0	0,000 Fee	ent Airspeed - VE (Knots)	125	to 150	N	Ŀ		7	9.9	000 Feet W	ent Airspeed - VE (Knots)	125	to 150				í	<b>⊣</b> :	227	55	1			295	111.8
3.0	5,000 to 1	valent Air	100	to 125	•						valent Air	100	to 125						48	22				20	21.4
	itude -	Equival	75	tò 100						Altitude -	Equival	42	100 100						12	4				16	7.7
	Alt		Less	Than 75								Less	Than 75												0.4
Time (Min)		Load	Factor	n <sub>z</sub>	Above 4.75 4.25 to 4.75 3.75 to 4.25 3.25 to 3.75 2.75 to 3.25 2.25 to 2.75 1.75 to 2.25 1.25 to 1.75		0.25 to 0.75 -0.25 to 0.25 -0.75 to -0.25 -1.25 to -0.75 Below -1.25	Total	Time (Min)		Load	Factor	nz	<b>π</b> 3		<u> </u>	2.75 to 3.25	9 9		0.25 to 0.75	-0.25 to 0.25	-0.75 to -0.25	Below -1.25	ਲ	Time (Min)
	1100									11EA															
	MMWA									MMWA															

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	F	lotai	ü	2		۰ 7	· <b>·</b>	00	53	472	4,012	0	979	1			5,414	1,439.9			Total		n <sub>z</sub>			_	<b>-</b> ,	9 %	30	. 07	97				373	243.0
		225	and	Above	-	•	-	ĸ	2	m	7	٧	Þ				18	3.1				225	and	2000					·	1	1				٣	1.3
		200	to	577		2	- <del></del>	7	9	19	108	9	9				176	67.7				200	to 225	0					u	n					S	11.6
व		175	to	007			7	7	19	190	1,995	91.7	410	3			2,628	671.6	9			175	5 to	9		,	- (	7 (	- 60	0	25				122	81.4
1,000 to 2,000 Feet W - 13,000 lb	(Knots)	150	3 5	175					18	200	1,589	000	2				2, 107	498.0	2,000 to 5,000 Feet W - 13,000 lb	(Knots)		150	to 175				•	٦ :	113	CTT	21				145	105.3
,000 Feet W	Equivalent Airspeed - VE (Knots)	125	to to	150			1	-	<b>∞</b>	55	304	2	<u> </u>	•			464	183.9	,000 Feet W	Equivalent Airspeed - VE (Knots)		125	to 150	201		-	•	m ç	10	<b>*</b>	15				91	42.2
1,000 to 2,	alent Airs	100	to	125						r	14	c	1				21	15.6	2,000 to 5,	ralent Airs		100	to 125	77				•	7	•					7	1.1
Altitude -	Equiv	75	\$ 5	100															Altitude -	Equiv		75	<b>\$</b> 5													
Alt		Less	Than	c)															Alt			Less	Than 75	2												
	-	Factor	n z		4.25 to 4.75		3.25 to 3.75		2.25 to 2.75		1.25 to 1.75	0 25 +0 0 25	-0 25 to 0 25	-0.75 to -0.25	-1.25 to -0.75	Below -1.25	Total	Time (Min)			Load	Factor	n z	Above 4.75	ţ	3.25 to 3.75	٤.	9	1.75 to 2.25	3	0.25 to 0.75	-0.25 to 0.25	-0.75 to -0.25	-1.25 to -0.75	Below -1.25 Total	Time (Min)
11EB																			11EC																	
MMWA																			MMWA				4													

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100	243.0		E	10121	ď						o	ю	7	•				15	118.0		Total	Torai	£	Z			,	ပ (	\$ C	501	1,311	376	1			1,826		503.0
	1.3			225	and	Above																225	בי ה ה	Above			(	7 (	7 6	7	10					16	,	1.7
¥	11.6			200	to L	677																200	3 5	225			,	<b>»</b> (	ų f	- ^-	116	56				170	i	36.8
Jb.	81.4	1b		175	<b>5</b>	700					u	n	6	i				œ	83.1			175	÷ t	200			(	7 4	nd	F 3	756	212	••			1,038	,	279.9
5,000 to 10,000 Feet W - 13,000 lb	105.3	5,000 to 10,000 Feet W - 13,000 lb	VE (Knots)	150	ដ្ឋ	6/1					·	n	2					2	31.1	7 - 14,000 lb	VE (Knots)	150	ţ	175					c	1 00	364	111				505		153.5
10, 000 Fee	42.2	.0, 000 Fee		125	\$ £	150							-	1				1	2.5	Altitude - 0 to 1,000 Feet W		125	Ş	150						ď	43	19				29		19.2
, 000 to 1	1:1	,000 to 1	Equivalent Airspeed -	100	to	165							-					-	1.2	- 0 to 1,	Equivalent Airspeed -	100	ţ	125							17	7				24		7.7
Altitude - 5		Altitude - 5	Equiv	75	t .	100														Altitude	Equiv	75	2 5	100							ĸ	-				9		3.9
Alternative Altern		Alt		Less	Than	C														•		4	Than	75														0.2
Ar s	Time (Min)		7 · · · · · · · · · · · · · · · · · · ·	Factor	n <sub>z</sub>	Above 4, 75	, £	Ş.	<u>و</u> .	<u>و</u> .	1.75 to 2.25	2		-0.25 to 0.25	-0.75 to -0.25	-1.25 to -0.75	Below -1.25	Total	Time (Min)		700	Factor	ישרוסו	Z <sub>11</sub>	Above 4.75	9	<u>.</u>	3.25 to 3.75	9 4	1 75 to 2 25		0.25 to 0.75	-0.25 to 0.25	-0.75 to -0.25	Folom - 1 25	Total		Time (Min)
HED	a grap and the	11ED																		11FA																		
MMWA	A	MMWA														4		_		MMWA																		

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11FB		Alt	Altitude - 1	,000 to 2,	,000 Feet	1,000 to 2,000 Feet W - 14,000 lb	1b				
	, peo. 1		Equiv	Equivalent Airspeed -		VE (Knots)				Total	
	Factor	Less	75	100	125	150	175	200	225	1001	
	n	Than	ţ	ţ	ಭ	ţ	\$	ţ	and	n	
		75	100	125	150	175	200	225	Above	l	
	3.75 to 4.25										
							1	1	1	3	
							7	1		2	
					Ĭ,	7	4	-		7	
				•	10	16	31	4		61	
				<b>-</b>	51	139	344	34		695	
	0.25 to 0.75			-	11	31	80	7		130	
	-0.25 to 0.25										
	-0.75 to -0.25										
	-1.25 to -0.75										
	Below -1.25 Total			7	72	188	461	84	-	27.7	
				1	1		4	2	•	1	
	Time (Min)		0.2	4.6	22.6	96.1	158.6	21.6	0.1	303.8	
11FC		Alt	Altitude - 2	, 000 to 5	,000 Feet	2,000 to 5,000 Feet W - 14,000 lb	115				
			Equiv	alent Airs	Equivalent Airspeed - VE (Knots)	E (Knots)					
	Load									Total	
	Factor	Less	22	100	125	150	175	200	225		
	$\mathbf{z}_{\mathbf{u}}$	Than 75	t (	to 125	to 150	to 175	to 200	to 22.5	and	n <sub>z</sub>	
	Ahove 4.75	2			2		2	ງ	2000		
	, ១										
	Ş										
	<u>.</u>						ı			1	
	2.25 to 2.75						-			-	
	2				г	2	ı			· 60	
	3			-	11	17	<b>∞</b>			37	
	0.25 to 0.75				4	œ	m			15	
	-0.25 to 0.25			1						-	
	-0.75 to -0.25										
	-1.25 to -0.75										
	Below -1.25			,	;	(	(			c L	
	Total			7	91	1.7	13			Ø O	
	Time (Min)			1.0	17.4	35.7	22.9	6.0		6.77	

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	28	77.9		Total		z u					٣					ĸ	23.8		Total		z u		4	21	112	106		2,438 23,203		4,951	13			31,291	8, 186.7
19 St					225	and													(	225	and	2004	-	· m	25	12	21	13 63	}	20				158	24.2
\$		6.0			200	to 225													•	200	to 225	3	7	16	29	37	83	223 1,238		245	7			1,908	443.0
q	13	22.9	16		175	to 200	3				7					2	18.9		1	175	, to		-	7	22	20	223	1,256		2,670	<b>∞</b>			16,014	4, 138.9
5,000 to 10,000 Feet W - 14,000 lb	27	35.7	W - 14,000 lb	VE (Knots)	150	to 175	<u>.</u>				1					1	4.9	VE (Knots)	1	150	to 175				1	9	94	781 8,513		1,626				11,021	2,724.4
,000 Feet	16	17.4	,000 Feet	1	125	to O z (														125	to 150				7	1	22	1,359		330	7			1,875	704.9
000 to 10	2	1.0	Altitude - 5,000 to 10,000 Feet W	Equivalent Airspeed	100	to 125	)   											Equivalent Airspeed -		001	to 125						•	212		50	<b>-</b>			569	117.1
Altitude - 5,			itude - 5,	Equiv	75	t 0												Equiv	1	. 75	100 100	3						36		01				46	32.8
Alt			Alt		Less	Than 75													,	Less	Than 75	2													1.4
	Total	Time (Min)		Load	Factor	n Z	Above 4.75	3 75 to 4.75	2 2	\$	1.75 to 2.25 1.25 to 1.75	0.25 to 0.75	-0.25 to 0.25	-1.25 to -0.25	Below -1.25	G	Time (Min)	Į,	Load	Factor	ដ	Above 4.75	0	Ş	\$		<u>.</u>	1.75 to 2.25 1.25 to 1.75		0.25 to 0.75	-0.25 to 0.25	-0.75 to -0.25	Below -1.25	Total	Time (Min)
11FD			11FD																																
MMWA			MMWA												0			MM 11																	

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K	TABLE XI MANEUVER nz VERSUS AIRSPEED FOR MISSION II BY WEIGHT BY ALTITUDE
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	į	Total		n z								11						11	4.2			To+21	lotai	,	n N								9					9	12	13.1
		i C	577	Above																			225	C77	Above															
1, 000 1b	(s:	o o	007	225															0.3	- 11,000 lb	-	ō	000	700	225	)														
eet W - 1	- VE (Knot	t	67.	200								4						4	0.1		VE Week	TOTAL TA	176	113	10 200	)							1					-	0	0.0
0 to 1,000 Feet W - 11,000 lb	Equivalent Airspeed - VE (Knots)		150	175								1						1	0.1	to 2,000 F	Familial Aimenced WE (Wante)	naade iiv i	04.	001	175	) •							4					4	0	7.6
Altitude - (	Equivalen		163	150								4						4	0.9	Altitude - 1,000 to 2,000 Feet W	T (11)	-dan varien	125	16.	150								1					-	-	
Altit		9	3 4	125								2						2	2.6	Alti			001	\$ \$	125															
		76	C ;	100															0.5				75	5 \$	100															
		700	The sa	75																			200	The	75															
	T	Foctor	1 2001	z	4	4.	4	ĸ,	3	7:	2	1.25 to 1.75	0	-0.25 to 0.25	-0.75 to -0.25	-1.25 to -0.75	Below -1.25	Total	Time (Min)			أرمعط	Factor		2,,	Above 4.75	0.4.	4	3,	3.	5	7	1.		-0. 25 to 0. 25	^	Below -1.25	Total	Time (Min)	(mm) 2007 t
12CA																				12CB																				
MMWA																				MMWA		A																		

MN	MWWA	1200		363-		Altinde -	nde - 2.00€	2. 000 to 5. 000 Feet W - 11. 000 1h	net W - 1	1. 000 1h			
4		· compa											
			Total				-	4	-			9	
			Time (Min)				0.1	9.2	3.8			13. 1	
M	MMWA	12CC				Alti	Altitude - 2, 00	2,000 to 5,000 Feet W - 11,000 lb	eet W - 1	1,000 15			2
							Equivale	Equivalent Airspeed - VE (Knots)	- VE (Knot	ts)			
			Load Factor	Less	75	100	125	150	175	200	225	Total	· · · · · · · · · · · · · · · · · · ·
			zu	Than 75	to 100	to 125	to 150	to 175	to 200	to 225	and	zu	**Anage*
			a) ·										_
			4. 4										=
			3. 25 to 3. 75										
			ų,										
			, v										
						2						7	
			0			1	1					2	
			-0.25 to 0.25										
			-0										
			0										
			Below -1.25 Total			8	1					4	
			Time (Min)			7.5	4.	17.2	6.1			35. 2	₩ NF CT 4359
F													
M	MMWA	12DA				Alti	Altitude -	0 to 1,000 Feet W - 12,000 lb	eet W - 1	2,000 1b			hays filling homber ordered
							Equivale	Equivalent Airspeed	- VE (Knots)	ts)			<b>D</b> MOTE NA
			Factor	Less	75	100	125	150	175	200	225	Total	
			zu	Than	to	to	to	to	<b>\$</b>	<b>3</b>	and	ជ	
				75	100	125	150	175	200	225	Above	8	
			4. 4.										
			4										146.1
			3. 25 to 3. 75										
			'n ~					^				c	
			7				1	1 4				<b>1</b> 10	
					1	6	21	198	3			232	
			0.25 to 0.75		7	4	8	ĸ	-			15	
			-0.75 to -0.25										
			-1. 25 to -0. 75 Below -1. 25										
			0		ы	13	25	500	4			254	
			Time Min		1 4	11.6	5.6	29.0	ی ک	0 1		615	

																				1
2 5 232	15	254	64.2		Ē	Total	z <sub>u</sub>		21 398	126		545	373.9			lotal n	22			14 235
						225	and Above		<b>-</b> 4			ĸ	0.4			225 and	Above			<b>8</b>
			1.9	- 12, 500 1b	ts)	200	to 225		4 43	6		99	17.3	- 12, 000 lb	(s:	200 to	225			2 20
٣	1	4	9.3	Feet W - 1	- VE (Kno	175	to 200		11	53		206	87.4	Seet W - 1	- VE (Knots)	175 to	200			6 <b>20</b>
2 4 198	rv.	506	29.0	0 to 2,000 ]	Equivalent Airspeed - VE (Knots)	150	to 175		5 151	52		208	134.1	) to 5,000 E	Equivalent Airspeed -	150 to	175			2 11
1 21	m	25	5.6	Altitude - 1,000 to 2,000 Feet W	Equivaler	125	to 150		45	10		55	65.0	Altitude - 2,000 to 5,000 Feet W	Equivalen	125 to	150			1 72
6	4	13	11.6	Alti		100	to 125		13	2		15	67.3	Altit		100 to	125			
1	2	٣	9.9			75	100						2.3			75 to	100			
			0.1			Less	1 han 75									Less Than	22			
2. 25 to 2. 75 1. 75 to 2. 25 1. 25 to 1. 75	0. 25 to 0. 75 -0. 25 to 0. 25 -0. 75 to -0. 25 -1. 25 to -0. 75 Below -1. 25	0	Time (Min)		heo.T	Factor	z	Above 4, 75 4, 25 to 4, 75 3, 75 to 4, 25	2.	0. 25 to 0. 75	-0.75 to -0.25 -1.25 to -0.75 -1.25 to -0.75	Ö	Time (Min)		[peo]	Factor n <sub>z</sub>	7	to to 4. 4. 4.	3. 25 to 3. 75 2. 75 to 3. 25 2. 25 to 2. 75	to 2.
				12DB										12DC						
				MMWA										MMWA						

1	Total	۶	Z							i	21	398	126						545	373 0				Total		ď	2							14	235	;	64					313	561 5	0.100
	225	and	Above							•	-	4							5	4	•				225	and	Above								2	-	-					3	7 1	7.0
s)	200	÷	225							•	4	43	6					•	99	17 3	•	2, 000 1b	s)		200	to	225							2	20	u	C					27	0 77	00.00
- VE (Knot	175	, ct	200							;	11	142	53					,	506	87.4	•	eet W - 13	- VE (Knot		175	to	200							6	20	-	61					65	7 681	135.0
Equivalent Airspeed - VE (Knots)	150	to t	175							ı	J.	151	52					•	807	134.1	•	Altitude - 2,000 to 5,000 Feet W - 12,000 lb	Equivalent Airspeed - VE (Knots)		150	ţ	175							2	7.1	23	77					65	8 801	170.0
Equivaler	125	to	150									45	10					1	55	65.0		tude - 2, 00	Equivaler		125	to	150							1	72	23	7					96	× 001	0.00
	100	to	125									13	2					1	15	67.3		Alti			100	ţ	125																49 1	
	75	ţ.	100																	2.3					75	to	100																ر بر	;
	Less	Than	75																						Less	Than	75																	
7	Load Factor	r r	3	4.	25 to 4.	to 4.	25 to 3.	75 to 3.	25 to 2	2 7	(5 to 2.	1.25 to 1.75	0.25 to 0.75	to	-	; 0	; -		Total	Time (Min)				Load	Factor	nz	1	Above 4.75	25 to 4.	75 to 4.	to 3.	75 to 3.	25 to		1. 25 to 1. 75	0 25 +0 0 75		<b>.</b>	-0.75 to -0.25	-1.25 to -0.75	Below -1,25	Total	Time (Min)	( )
																						12DC																						
																						MMWA	4																					

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	Ē	lotal	zu							,	ν,	8					9	94.5				Total	1000	n,	7						1	15	349	73			438	235, 3	
		225	and	Above																			225	and	Above							ı	ις				2	0.7	
12,000 lb	(8)	200	to	577						,	-	-					7	3.0	ı I	3, 00 lb		(s)	200	to	225							2 :	6				11	6.8	
Feet W -	- VE (Knot	175	to	007							7	1					3	44.8		0 to 1,000 Feet W - 13,00 lb	į	- VE (Knot	175	to	200							10	105	19			134	90.2	
Altitude - 5,000 to 10,000 Feet W - 12,000 lb	Equivalent Airspeed - VE (Knots)	150	o i	175														36.7		0 to 1,000		Equivalent Airspeed - VE (Knots)	150	to	175							۳ <u>۱</u>	156	24			183	71.8	
itude - 5, 00	Equivale	125	o S	150								-						10.0		Altitude -		Equivale	125	to	150							;	41	14			95	26.4	
Alt		100	to	671																Alt			100	to	125							(	54	11			35	27.4	
		75	to c	100																			75	to	100								<b>∞</b>	5			13	11.5	
		Less	Than	0																			Less	Than	75							•	-				1	0.5	
	7	Factor	zu	Above 4.75	25 to 4.	75 to 4.	25 to 5.	C t	25 to 2.	1.75 to 2.25	25 to 1.	0.25 to 0.75	9	to -0.	_	Below -1.25	Total	Time (Min)				Deo.T	Factor	<sup>2</sup> u	7	4	4.	4.	3.	3.	2.	1.75 to 2.25	<del>-</del>	0.25 to 0.75	0	-1. 25 to -0. 75 Below -1. 25	otal	Time (Min)	
12DD																				12EA																			
MMWA																				MMWA																			

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Service of the servic	8									2	•	or	,			٠,		8											_	506	75			ç	787	5
	235.3			Total	$\mathbf{z}_{\mathbf{u}}$					45	929	188				906		529.3			Total		$\mathbf{z}_{\mathbf{u}}$							50	•			ì	3	924.
	0.7			225	and					2	11		1			17		2.7				225	and Above							1				•	<b>-</b>	0.2
3, 000 lb	8.9	- 13, 000 lb	(8	200	to 225	j				8	53	10				11		24. 2	3, 000 lb	(s:		200	to 225							17	8			;	07	94.4
eet W - 1.	90.2	eet W - 13	- VE (Knot	175	to 200					16	228	28				302		194.5	eet W - 1	- VE (Knot		175	to 200						-	76	27				104	313.7
Altitude - 1,000 to 2,000 Feet W - 13,000 lb	71.8	Altitude - 1,000 to 2,000 Feet W	Equivalent Airspeed - VE (Knots)	150	to 175	1				13	317	104				434		189. 2	Altitude - 2,000 to 5,000 Feet W - 13,000 lb	Equivalent Airspeed - VE (Knots)		150	to 175							87	34				171	382.9
tude - 1, 000	26.4	ude - 1,000	Equivalen	125	to 150					ļ	29	14				92	c C	6.8/	tude - 2,00	Equivaler		125	to 150							24	10				34	103.4
Alti	27.4	Altit		100	to 1.25	ì				ı	ιΩ	_				9		39.4	Alti			100	to 125							7	7				7	29.9
1	11.5			75	to 100												,	0. 4.				75	\$ C	1												
	0.5			Less	Than 75																	Less	Than 75	?												
de de la companya de	Time (Min)		7	Factor	$\mathbf{z}_{\mathbf{u}}$		4. 4	3,	2. 25 to 2. 75		1. 25 to 1. 75	0	-0.25 to 0.25	-0.75 to -0.25	-1. 25 to -0. 75 Below -1. 25	^	T:	Time (Min)			Load	Factor	zu	Above 4.75	4	to 4.	<del>ر</del> ب	2.75 to 3.25	; c	1. 25 to 1. 75	0.25 to 0.75	<b>.</b>	; o	Below -1.25	Total	Time /Min)
12EB		12EB																	12EC																	
MMWA		MMWA													e.				MWWA																	

														Ten, Ellingger de 4 et fou es j				The Marine of Marine and Marine a	ro uraks (PRSRA	<b>sale</b> (Treatment on query	<b>Marking</b> houghpus so	and design may		
282	924.5		To+21	1001	$\mathbf{z}_{\mathbf{u}}$			16	15			33	379.7		,	Total	$\mathbf{z}_{\mathbf{u}}$			2			e	63.8
7	0.2			225	and Above											225	and	Above						
20	94.4	13, 000 15	s)	200	to 225								15.0	- 13,000 1b	s)	200	to S	225						
104	313.7	Feet W -	- VE (Knot	175	to 200			13	11			24	248.3	Feet W -	- VE (Knot	175	t c	200	7				7	4.9
121	382.9	to 10,000	Equivalent Airspeed - VE (Knots)	150	to 175				3			9	74.0	00 .o 15, 000	Equivalent Airspeed - VE (Knots)	150	t 5	175		7			1	56.7
34	103.4	Altitude - 5,000 to 10,000 Feet W - 13,000 lb	Equivalen	125	to 150			2	-1			3	42.5	Altitude - 10,000 .o 15,000 Feet W	Equivalen	125	to	150		7			1	2, 1
2	29.9	Altit		100	to 125									Altit		001	£ 5	125			•			
				75	to 100											75	<b>3</b> 5	100						
				Less	Than 75											289	Than	75						
Total	Time (Min)		Teo.	Factor	$\mathbf{z}_{\mathbf{u}}$	° ct ct .4. 4.	o t	t :		-0. 25 to 0. 25 -0. 75 to -0. 25	-1. 25 to -0. 75	Total	Time (Min)			Load	n z	" 5 5 5 4 4 4 4 4	to 2. to 1.	0.25 to 0.75	-0.25 to 0.25 -0.75 to -0.25	-1. 25 to -0. 75 Below -1. 25	Total	Time (Min)
		12ED												12EE										
		MWWA												MMWA										

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	E	rotai	ď	N					_	76	į	<b>4</b> 7				101	75.3			Total		$\mathbf{z}_{\mathbf{u}}$							3	180	<u>.</u>	611				298	163.8
		225	and	Above																	225	and	Above														
£, 000 1b	s)	200	ţ	225						7						-	4.1	t, 000 1b	s)		200	to 22.5	C <b>77</b>						7	3						4	1.1
eet W - 14	- VE (Knot	175	ð	200						97	Ć	•				35	23.8	Seet W - 14	- VE (Knot	ļ	175	to	7007						1	34	71	:				49	36.2
0 to 1,000 Feet W - 14,000 lb	Equivalent Airspeed - VE (Knots)	150	ţ	175					1	29	t	-				37	16.2	0 to 2,000 F	Equivalent Airspeed - VE (Knots)	,	150	to 176	611						-	119	6	2				213	79.7
Altitude -	Equivaler	125	2	150						15	•	r			,	19	16.0	Altitude - 1,000 to 2,000 Feet W - 14,000 lb	Equivaler	•	125	to	25							23	ec.	•				31	41.7
Alti		100	\$	125						6		1			•	•	10.3	Alti			100	to 125	3														4.6
		75	ţ	100						7	-	-1			,	m	5.0			į	£ .	\$ E	3							7						<b>-</b>	0.5
		Less	Than	75																•	Less	Than 75	2														
	fec. I	Factor	n z		Above 4 75	į 4		7	~		0 25 +2 0 75	-0. 25 to 0. 25	-0.75 to -0.25	-1.25 to -0.75	Below -1.25	Total	Time (Min)		,	Load	r actor	n z	Above 4.75	4.	4.	'n	e,	7	۲,	1.25 to 1.75	0.25 to 0.75	-0.25 to 0.25	-0.75 to -0.25	-1. 25 to -0. 75	Below -1.25	Total	Time (Min)
12FA																		12FB																			

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298	163.8		1	Total	zu		4	193	141		338	472.4		E	lotal	$\mathbf{z}_{\mathbf{u}}$		Ξ	11	=	22	28.7
				225	and										225	and						
4	1.1	, 000 15	~	200	to 225	3						8.8	- 14,000 lb	<u></u>	200	to 225		-	•		Т	0.5
49	36.2	Seet W - 14	- VE (Knots	175	to 200		2	38	38		78	133.6	Feet W - 1	- VE (Knots	175	to 200		ư	1	9	11	13.8
213	7.62	Altitude - 2,000 to 5,000 Feet W - 14,000 lb	Equivalent Airspeed - VE (Knots)	150	to 175	2	2	143	91		236	258.2	5,000 to 10,000 Feet W	Equivalent Airspeed - VE (Knots)	150	to 175	) -	ư	n	w	10	11.6
31	41.7	itude - 2, 00	Equivale	125	to 150			12	12		24	46.1	Altitude - 5,00	Equivale	125	to 150						2.8
	4.6	AI		100	to 125							25.7	Alt		100	to 125						
7	0.5			75	to 100										75	to 100						
				Less	Than 75	?									Less	Than 75						
Below -1.25 Total	Time (Min)		7	Load Factor	z u	Above 4.75 4.25 to 4.75 3.75 to 4.25 3.25 to 3.75	. 2. 2.	1. 25 to 1. 75	0.25 to 0.75 -0.25 to 0.25	-0. (3 to -0. 25 -1. 25 to -0. 75 Below -1. 25	_	Time (Min)		()  -	Factor	$\mathbf{z}_{\mathbf{u}}$	Above 4.75 4.25 to 4.75 3.75 to 4.25 3.25 to 3.75 2.75 to 3.25	to 2.		0. 25 to 0. 75 -0. 25 to 0. 25 -0. 75 to -0. 25 -1. 25 to -0. 75 Below -1. 25		Time (Min)
		12FC											12FD									
		MMWA											MMWA									

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E	10141	zu							11	=	•				22	28.7		II II	Total		zu	ı						4	107	2, 595	8	*				3, 560	4,047.7	
	225	and	3000																	225	and	Apove							9	23	,	,				31	5.6	
_	200	to 225	3						1						7	0.5		_		200	to	225							17	148	80	3				193	243. 2	
Equivalent Airspeed - VE (Knots)	175	to 200							2	4	•				11	13.8		Equivalent Airspeed - VE (Knots)		175	to	200							20	748	250	2				1,048	1, 360. 1	
nt Airspeed	150	to 175	)						5	ur	•				10	11.6		nt Airspeed		150	to	175						3	32	1, 282	441					1,758	1,585.5	
Equivale	125	to 150	2													2.8		Equivale		125	\$	150						7	7	322	102					427	548.0	
	100	to 125																		100	\$	125								29	23	ì				82	275.5	
	75	to	2																	75	ţ	100								12	œ	)				20	29.1	
	Less	Than 75	2																	Less	Than	75								7						1	9.0	
, E	Factor	zu	Above 4.75	to	4.	3	7	to 2.	<u>-</u>	0.25 to 0.75	-0.25 to 0.25	-0.75 to -0.25	-1.25 to -0.75	Below -1.25	Total	Time (Min)			Load	Factor	n <sub>z</sub>	•	4.	2	to 4.	က်	to 3.	7	to 2.	to 1.	0.25 to 0.75	-0. 25 to 0. 25	-0.75 to -0.25	-1.25 to -0.75	Below -1, 25	otal	Time (Min)	
																	12																					

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MANEUVER nz VERSUS AIRSPEED TABLE XII

	Total		n,	4		4	2.1	112	106	447	2,545	25, 798	5,805	13				34,851	12,234.4
		225	and	Above		-	8	25	12	2.1	19	98	22					189	29.8
		200	ţ	225		2	16	<b>62</b>	37	83	240	1,386	273	2				2, 101	686.2
		175	ţ	200		1	2	22	20	223	1,306	12,530	2,920	80				17,062	5,499.0
E (Knots)		150	ţ	175				1	9	26	ω	6,	2,067					12,779	4,309.9
Equivalent Airspeed - VE (Knots)		125	ţ	150				2	1	23	161	1,681	432	2				2,302	1,252.9
quivalent A		100	ţ	125							9	271	73	1				351	392.7
й		75	ţ	100								48	18					99	61.9
		Less	Than	75								-						-	2.0
	Load	Factor	$\mathbf{n}_{\mathbf{z}}$		Above 4.75	4.25 to 4.75			2.75 to 3.25			1.25 to 1.75	0.25 to 0.75	-0.25 to 0.25	-0.75 to -0.25	-1.25 to -0.75	Below -1.25	Total	Time (Min)
COMP																			

TABLE XIII EQUIVALENT MANEUVER nze VERSUS AIRSPEED FOR MISSION I BY ALTITUDE

MMWA 110A

Altitude - 0 to 1,000 Feet

Equivalent Airspeed - VE (Knots)

E	lotal	n Z	e G	1	19	88	89	153	625	3,575	16,430	, , , ,	1,164	4			(	22, 127	3,915.3		Total		, a	ze	-	9	3	17	37	336	1,936	10,757	901	2	ı			13,996	11	5, 385. (		901	J
	225	and	Above		٣	22	10	6	12	21	38	;	∞					123	12.0			225	and	Above	7			4	1	6	9	80	4	r				28	•	<b>4</b>		4	
	.200	\$	225	-	11	53	31	48	109	296	831	;	89					1,469	243.9			200	to	225	<b>!</b>	m	2	9	rv	22	92	441	4	*				965		1 (4. 3	;	41	
	175	<b>\$</b>	200		20	12	25	85	345	1,985	8,370	,	869	3				11,528	2,040.4			175	ţ	200		2	1	E	14	129	912	5,055	490	,	1			6,607	1 544 4	1,044.4		490 1	4
(Knots)	150	<b>5</b>	175			-	7	10	154	1,186	6,214		327					7,894	1,341.4	2,000 Feet	VE (Knots)	150	ţ	175				2	13	132	744	3,815	278	)				4,984	0 700 1	1,096.0	0	278	
Equivalent Airspeed - VE (Knots)	125	t	150					1	S	82	657	, 1	36	-			Ċ	782	185.9	1,000 to 2,000	Airspeed - VE	125	\$	150				2	4	47	190	1,297	81	; <del></del>				1,622	7 217	4 1 <b>6.</b> .	6	8 7	
alent Air	100	ę ę	125							E)	232	:	3				c	738	61.1	1		100	\$	125						3	œ	138	9	ŀ				155	7		4	٥	
Equiva	75	£ \$	100							2	87	i	3				5	76	29.3	Altitude	Equivalent	75	\$	100								ю	-	i				4	, II	o.	-	<b>-</b>	
	Less	Than	75								1						-	<b>-</b>	1.4			Less	Than	75																			
heo. I	Factor	n Z	a e		Ş	2	\$	2	ç	2	1.25 to 1.75		0.25 to 0.75	-0.25 to 0.25	-0.75 to -0.25	-1.25 to -0.75	Below -1.25	Total	Time (Min)		Load	Factor		ə Z		4.25 to 4.75	ದಿ	ದಿ	2		ខ	2	0.25 to 0.75	-0.25 to 0.25	-0.75 to -0.25	-1.25 to -0.75	Below -1.25	Total	Time (Min)	ıme (Min)	0.25 to 0.75	-0.25 to 0.25	-0.75 to -0.25 -1.25 to -0.75
																				MMWA 110B																							

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and a property of the second o		(V)	Carefaire of mediatroneces is the benefit from	the designation of the contract of the contrac	0 Feet	.000 to 10,000 Feet	Altitude - 5,00	Altit			מיוו	AMMAN
										-1, 25 to -0, 75 "		
										-0.45 to 0.25		
	11			6	2					0.25 to 0.75		
	47		8	92	13	4	<b>-</b>			ţ		
16												
										2.25 to 3.25		
Þ												
	<b>u</b>	Above	225	200	175	150	125	100	7.5	•		
	nz	and	to	\$	ţ.	to .	្ន ទ	\$ £	Than	. re		
		225	200	175	150	125	100	75	Less	r actor n		
	Total									Load		
enting.					(Knots)	Airspeed - VE (Knots)	Equivalent Air	Equiv				
e Spiring Shake or option of					00 Feet	5,000 to 10,000 Feet	Altitude - 5,0	Alti			110D	MMWA
	619.8	8.9	21.5	254.4	234.8	97.2	5.1			Time (Min)		
	1,027	11	22	383	375	216	20			Total		
										-1.25 to -0.75 Below -1.25		<b>)</b>
										-0.25 to 0.25		£
	69	-	-	25	24	17	-			0.25 to 0.75		
	822	10	20	304	311	160	17					
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				-		-				3.75 to 4.25		
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	r e	Above	225	200	175	150	125	100	75	<b>a</b>		
	ţ	677 677	200 4	to	to	to t	5 5	<u></u> 2	Than	nz		
	Total	,	ć	1	031	125	001	7	939	Load		
					E (Knots)	Airspeed - VE (Knots)	Equivalent Air	Equi				
					00 Feet	2,000 to 5,000 Feet	Altitude - 2,	Alt			110C	MMWA
	3, 385. 7	4.9	174.3	1,644.4	1,096.0	412.7	49.7	3.5		Time (Min)		
	13,996	28	969	6,607	4,984	1,622	155	4		Delow -1.25 Total		
										-1.25 to -0.75		

Altitude - 5,000 to 10,000 Feet

MMWA 110D

Altitude - 5, unu to 10, unu reet

Equivalent Airspeed - VE (Knots) Less 75 100 125 150
75 100
Equivalent Airspeed
75
1 nam 10 100
2
1 90
4
1 96
1.4 32.8

TABLE XIV EQUIVALENT MANEUVER n<sub>ze</sub> VERSUS AIRSPEED FOR MISSION II BY ALTITUDE

MMWA

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4 34

		Total	$\mathbf{n}_{\mathbf{z}}^{\mathbf{z}}$	1 3 136	1,027		1,187	379.0		T-+0-F	10(41	n <sub>z</sub> e		13	212 1,926	130	2,281
		225	and Above	m	2		52	0.7			225	and Above		4	6 11		21
		200	to 225	4	15		19	13.1			200	to 225		1	37 91	Ŋ	134
		175	200	1 44	225		277	123.4			175	to 200		Ŋ	84 578	4 1	708
eet	(Knots)	150	175	1 1 8 1 1	487		574	117.2	) Feet	(Knots)	150	to 175		3	80 950	75	1, 108
0 to 1,000 Feet	Equivalent Airspeed - VE (Knots)	125	150	н 4	140 5		150	48.8	Altitude - 1,000 to 2,000 Feet	Equivalent Airspeed - VE (Knots)	125	150			5 238	6	252
Altitude - (	alent Air	100	125		112		114	51.8	ude - 1,0	alent Airs	100	125			55		55
¥	Equiv	75	100		44 2		46	23.4	Altit	Equiv	75	100			3		e .
		Less	75		7	·	2	9.0			Less	75					
		Load Factor n-	ze.	4 4 4 % % % N N N	1.25 to 1.75 0.25 to 0.75	1 1 1	Total	Time (Min)		Load	Factor	ze	Above 4.75 4.25 to 4.75 3.75 to 4.25 3.25 to 3.75 2.75 to 3.25	. t	2 2	0.25 to 0.75 -0.25 to 0.25 -0.75 to -0.25 -1.25 to -0.75	below -1.25 Total -J.25 W 0.25
120A									120B								

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MMWA

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t	az e	2 1 86	3 92	503.0		T	10141	$^{\mathrm{n}_{\mathrm{Z}}}$			,	<b>'</b> '	1			٤	91.9	Ē	10141	$^{\mathrm{n}}\mathrm{z}_{\mathrm{e}}$	
225 and	Above						225	and Above											225	and Above	
200	225	4	4	18.4			200	to 225											200	to 225	
175	200	61	64	306.9			175	to 200			,	-				-	11.9		175	to 200	
150	175	2 16	81	122.3	0 Feet	- VE (Knots)	150	to 175				-	1			7	76.8	(Knots)	150	to 175	
125	150	1 2	9	55.3	Altitude - 10,000 to 15,000 Feet	speed - VE	125	to 150									3.3	Equivalent Airspeed - VE (Knots)	125	to 150	
100	125				ude - 10,0	Equivalent Airspeed	100	to 125										valent Air	100	to 125	
75	100				Altit	Equi	75	to 100										Equi	75	to 100	
Less	1 nan 75						Less	Than 75											Less	Than 75	
Factor	"ze	Above 4.75 4.25 to 4.75 3.75 to 4.25 3.25 to 3.75 2.25 to 2.75 1.75 to 2.25 1.25 to 1.75	0.25 to 0.75 -0.25 to 0.25 -0.75 to -0.25 -1.25 to -0.75 Below -1.25	Time (Min)		7 C 1	Factor	$^{\mathrm{n}_{\mathbf{z}_{\mathbf{e}}}}$	Above 4.75	3.25 to 3.75			0.25 to 0.75	-0.75 to -0.25	-1.25 to -0.75 Below -1.25	ď	Time (Min)	j	Load	$^{\mathrm{n}}\mathrm{z}_{\mathrm{e}}$	Above 4.75
					MMWA 120E				(									MM 12			

4.25 to 4.75

Altitude - 10,000 to 15,000 Feet

	Total		$\mathbf{n}_{\mathbf{z}_2}$	<b>v</b>								2	_	•					"	1	91.9		Total		n_	e						22	433	4. 521		221				5, 198	4,047.7
		225	and	Above																				225	and	Above						4	6	21	1					34	5.6
		200	ţ	225																				200	ţ	225						-	48	173	1	œ				230	243.2
		175	to	200								<b>-</b>							_	•	11.9			175	\$	200						6	156	1.247		89				1,480	1,360.1
(Knots)		150	ţ	175								1	-	•					2	1	76.8	(Knots)		150	ţ	175					7	7	506	2, 196	1	104				2,514	1,585.5
Equivalent Airspeed - VE (Knots)	1	125	to	150																	3.3	Equivalent Airspeed - VE (Knots)		125	ţ	150						-	14	661	1	35				711	548.0
alent Airs		100	to	125																		alent Airs		100	ţ	125								174	:	4				178	275.5
Equiv		75	ţ	100																		Equiv		75	to	100								47	•	2				49	29.1
	ı	Less	Than	75																				Less	Than	22								2	ŀ					2	9.0
70 C	Load	Factor	$^{\mathrm{n}}\mathrm{z}_{\mathrm{e}}$	)	ೞ	2	3.25 to 3.75	2	9	3 5	2	1.25 to 1.75	0.25 to 0.75		-0.25 to 0.25	-0.75 to -0.2\$	-1.25 to -0.75	Below -1.25	~		Time (Min)		Load	Factor	u,	n O	4.	to 4.	3.75 to 4.25	to 3.	to 3.	to 2.	to 2.	to	; }	0.25 to 0.75	-0.25 to 0.25	-0.75 to -0.25		R	Time (Min)
																					,	MM 12																			

TABLE XV EQUIVALENT AIRSPEED - V<sub>e</sub> (KNOTS)

F L			ľ							10401
Load		Less 1.	ر5 ا	100	125	150	175	200	522	Lotal
Factor		Than	To	To	To	To	To	To	and	
NZE		15	100	125	150	175	200	225	Above	NZE
Above 4	. 75							_	-	,,
\$	75						α	14	• •	70
} ;	3.0				-	•	9 ;	# L	۲ (	0.7
0	<b></b> 25				<b>-</b>	_	13	55	22	92
Ç	. 75				2	4	53	37	14	98
to	. 25				<b>∞</b>	24	101	53	10	196
2.25 to 2	2.75			m	63	301	489	132	19	1,007
to	7		7	13	311	2, 168	3,097	421	36	6,048
1.25 to 1	. 75	м	137	295	2,779	12, 549	15,002	1, 468	7.7	32, 577
0.25 to 0	0.75		9	14	169	735	1, 290	139	13	2, 366
to	. 25				2		4			9
-0.75 to -0	-0.25									
to	-0.75									
Below -1.	. 25				•					
Total		٣	145	265	3, 335	15, 782	20,033	2, 320	196	42, 406
Time (Min)	in)	2.0	61.9	392.7	1, 252.9	4, 309.9	5, 499.0	686.2	29.8	12, 234, 4

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A primary objective of this effort was to provide operational data for establishing future STOL aircraft design criteria.

To accomplish this end, two OV-1A aircraft were selected that were participating in air-assault maneuvers. Approximately 200 hours of flight data were recorded within approximately 10 weeks. The parameters recorded were: airspeed, altitude, outside air temperature, and acceleration at the aircraft center of gravity. In addition, supplementary data were collected on the type of mission and gross weight of the aircraft.

These data were presented as several frequency-of-occurrence forms, exceedance curves, and gust spectra.

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